Vol. XXVII. Part 10.

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The Journal of the Department of Agriculture of Victoria, Australia.

October, 1929.

PRINCIPAL CONTENTS

Cool Storage of Fruit

Results of Potato Manurial Trials, 1928-29

Conservation of Fodder on Dairy Farms

Rind-Marking of Citrus Fruits

Red Scale on Citrus Trees

Experiments in Cincturing Navel Orange Trees

Sheep Tick and Sheep Lice

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THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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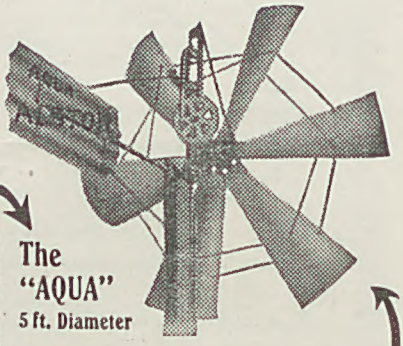

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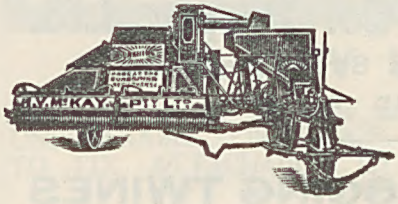

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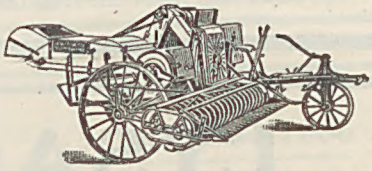

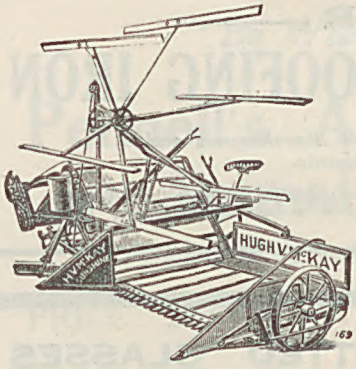

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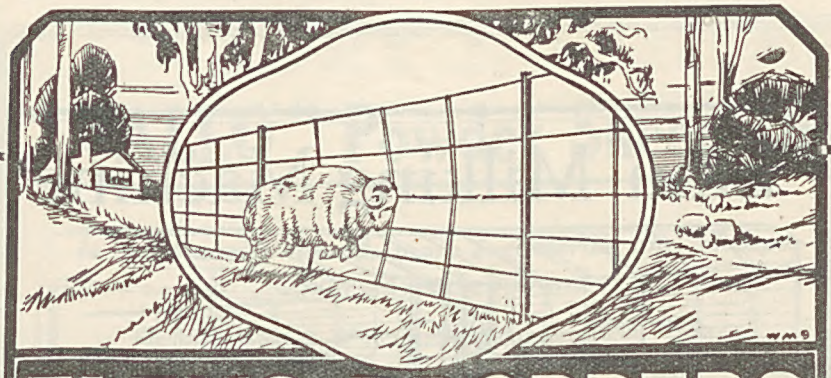

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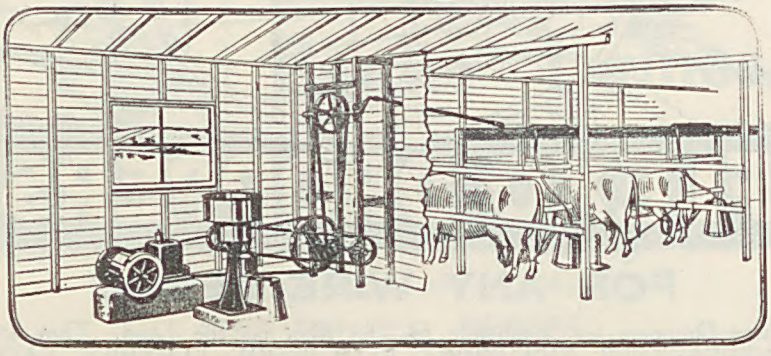

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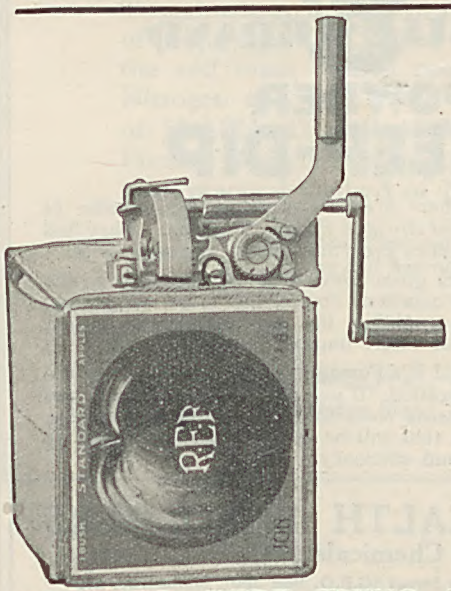

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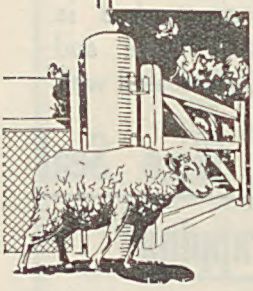

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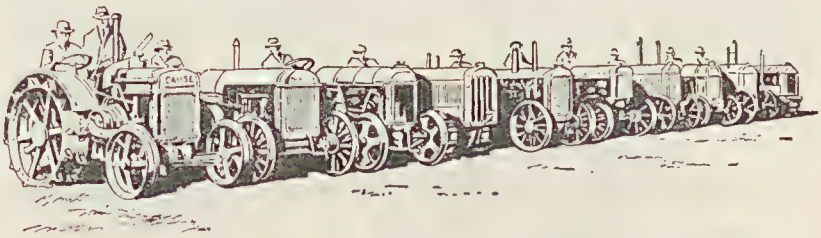

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THE JOURNAL

OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XXVII. October, 1929. Part 10

COOL STORAGE OF FRUIT.*

RECENT RESEARCH WORK.

By G. B. Tindale, B.Ag.Sc.

The object of cool storage as applied to fruit is to retard the life processes which continue after the fruit is picked, and so by lengthening the life of the fruit, extend its marketing period.

Research work, in so far as fruit cool storage is concerned, may conveniently be divided into two parts, the first dealing with the way in which pre-storage factors affect the subsequent behaviour of the stored fruit; the second is concerned with the actual life processes of the stored fruit, and how these are influenced by the cold storage conditions of temperature, humidity, and atmospheric composition.

Pre-storage Factors.

Pre-storage factors affecting the subsequent keeping quality are numerous, and, although one may make general observations of great value, yet it is only by means of carefully-controlled experiments, conducted over several seasons, that one is able to definitely prove a point.

Take, for instance the important factor, climate. We have made the general observation over several seasons that Williams pears grown in the warm Goulburn Valley keep much better than the same variety of pear grown in the cooler southern districts.

Calwell has conducted in the United States of America an elaborate experiment with apples to test the effect of climate on the keeping quality, and he found that in years of most sunshine the greatest quantity of sugar is stored in the fruit and the fruit keeps longest.

* Paper read before Cool Stores Association of Victoria, 14th August, 1929.

Cultural methods, such as cultivation, manuring, irrigation, pruning, all have a decided influence on the size and texture of the apple. It is very well known that over-sized, soft-textured fruits do not store well, and cultural operations should be directed towards producing firm-fleshed, medium-sized fruits. According to Dr. Barker, of Cambridge, who has examined several shipments of Australian fruit on arrival in England, there is a markedly greater wastage among the large-sized apples, and he raises the question whether it would not be advisable to restrict the export of the large sizes.

So far as irrigation is concerned we have evidence that late watering causes apples to break down rapidly in cool store. Jonathans from Ringwood were being picked at weekly intervals. Owing to the dry weather, the first two pickings consisted of very small apples. Between the second and third pickings bounteous autumn rains fell. The apples began to swell rapidly, the fourth and fifth pickings being of very large sizes. It was found that the pickings after the rain, especially the fourth and fifth, suffered from breakdown, while those made before the rain kept excellently.

One of the most important pre-storage factors which influence the subsequent storage life is the stage of maturity at picking time.

Undoubtedly there is a correct stage at which to pick fruit for storage. Apples picked when too green shrivel; in addition, they lack size and quality. Those left on the tree too long become soft, and subsequently suffer from breakdown in store. Apples should, therefore, be picked at an intermediate stage of maturity.

As fruits vary from year to year in their time of ripening, it is not possible to specify the best date for picking the various varieties of apples, but there is a very reliable guide in the form of the colour of the unblushed side of the apple. It will be found that, as the apple ripens, the colour of this side of the fruit changes from a green, through a green-yellow, to a yellow. The fruit should be picked when the unblushed side is green-yellow.

Palmer, of the Summerland Experimental Station, British Columbia, Canada, has carried out tests extending over several seasons with Jonathans, picking them at three stages of maturity, i.e., when the unblushed side is —(*a*) green, (*b*) green-yellow, and (*c*) yellow. His experiments have definitely proved that where the Jonathans were left on the trees too long—i.e., when the unblushed side had turned yellow—the percentage of breakdown was very high. Fruit picked when at the intermediate stage of maturity was found to be of good quality and average size, and suffered little from subsequent breakdown. In order that orchardists may readily recognize the correct stage of maturity for picking Jonathans, Palmer has devised a very simple colour chart. On it are pasted the three colours, each colour being perforated by a large hole. By placing the unblushed side of the apple against the hole, the colour can then be quickly matched.

Local observation is in exact agreement with Palmer's results, and orchardists are advised to give this matter of maturity at picking time much consideration.

Life Processes after Storage.

I shall now pass on to research work directed towards studying the life processes which continue after the fruit is picked, and how the storage conditions of temperature, humidity, and composition of the atmosphere affect these processes.

When the fruit is stored, it continues to take in oxygen and give off approximately equal quantities of carbon-dioxide. At the same time the sugars and acids which were formed while the fruit was growing are gradually used up, heat being evolved in the process.

By measuring the rate of production of carbon-dioxide, one obtains a measure of the rate of living of the fruit. This line of research has been carried out by the Low Temperature Research Station, Cambridge, with results of great practical and scientific value. It was found that with the apple the respiratory activity steadily increased after the fruit was placed in store. In one case with apples stored at 54 deg. F., there was a steady increase in respiratory activity for 25 days; after that time the activity gradually diminished. At the point of greatest activity, called the climacteric, it was found that flavour and aroma were developed to a maximum. After the climacteric is reached, and activity begins to slow down, the apple is definitely on the down grade, and quality suffers. It becomes mealy, while the flavour and aroma are poor. Just before the death of the apple, the respiratory activity slightly increases; then the production of carbon-dioxide ceases; the apple then ceases to live. It is found that, even though the apple be dead, there still remains some sugars and acids.

If fruit of good quality is to be marketed, one must not leave it in the store after the climacteric has been passed. As varieties of apples differ in their respiratory rates, they therefore vary in the times taken to reach the climacteric; in other words, some varieties are better keepers than others. By recording the time taken to reach the climacteric, one is enabled to forecast the approximate cool storage life of different varieties of fruit. By cool storage life is meant the maximum period in store without impairing quality, either in store or during the marketing period. The forecasts made by the Cambridge people for the cool storage life of English apples would probably not apply to our varieties. However, those worked out by the Oregon State Agricultural College, U.S.A., under their conditions of climate, &c., give an indication of the storage life of several varieties of pears which are widely grown here. Their results are—

Bartlett (Williams)	30 to 40 days
Howell	90 to 120 „
Bosc	90 to 120 „
Comice	100 to 110 „
d'Anjou	150 to 180 „
Winter Nelis	180 to 210 „

Having thus seen how the activity of the fruit (taking the apple as an example) can be determined, by measuring the carbon-dioxide evolved, one then can, by similar means, study the effect of temperature, humidity, and atmospheric composition on the apple in cool store.

So far the effects of temperature have received most attention from investigators. By lowering the temperature the life processes are slowed, and so the storage life increased. In general the aim has been to store at a temperature a little above the freezing point, but recent work at Cambridge has shown that most fruits are definitely harmed by the application of such low temperatures. Apples have been stored at accurately controlled temperatures from the freezing point upwards, and it has been found that some varieties suffer from internal breakdown or premature death if stored below 40 deg. F. This did not apply to all varieties of apples, but susceptible varieties, such as Bramley and Lane's Prince Albert, kept far longer at temperatures above 40 deg. F.

Further experiments have shown that certain varieties of pears, plums, peaches, oranges, tomatoes, &c., are all susceptible to low temperature breakdown; indeed, according to experiments by Barker, of Cambridge, tomatoes are injured if stored below 50 deg. F. It should be particularly noted that the breakdown frequently does not manifest itself until the fruit is removed from store; and in this connexion it is worth mentioning that, according to reports received by Barker, breakdown is particularly noticeable in some varieties of Australian apples, particularly Cox's Orange Pippin, Ribston Pippin, and Jonathan, after their removal from ship.

This matter of temperature as affecting cool storage life is obviously a matter of prime importance, for it may so happen that we have been adopting too low a storage temperature, and many of the storage diseases affecting apples, pears, peaches, &c., may have been brought about through this cause.

Dealing next with humidity, very little research work has been carried out in this direction. It is known that too low a humidity causes wilting of the fruit. But, on the other hand, it is not known if excessive humidity has any harmful effects, although, in experiments carried out by McClelland and Tiller in New Zealand, it was observed that breakdown of apples was associated with excessive humidity. It would appear that with fruits such as oranges, grapes, plums, and peaches, which are so readily attacked by various moulds, the humidity of the storage chamber would play a part in the germination and development of such moulds, and hence the keeping qualities of the fruit.

Lastly, there is the effect of the composition of the atmosphere on the storage life. This is quite a new development in cold storage research, and it has been developed with striking success by the Low Temperature Research Station, Cambridge. In a normal atmosphere, oxygen is present to the extent of 21 per cent. and carbon-dioxide to the extent of 0.04 per cent. In an unventilated chamber the carbon-dioxide produced by the fruit accumulates, and at the same time the oxygen supply is diminished by a corresponding amount.

When the atmosphere contains carbon-dioxide to the extent of from 10 to 15 per cent. and oxygen to the extent of about 10 to 5 per cent. (the sum of the carbon-dioxide and oxygen remaining constant at about 21 per cent), the ripening of apples is very appreciably retarded, and in some instances the cool storage life is prolonged by 100 per cent. According to the Cambridge experiments, it was found that the change in colour from green to yellow in the course of ripening was greatly

retarded, that the softening of the flesh tissues proceeded more slowly under gas storage, and that gas-stored apples remained sour to the taste for a considerably longer period than those kept in air. Lastly, it was found that the retarding effect of reducing the oxygen and increasing the carbon-dioxide in the storage atmosphere progressively increased to a point beyond which injurious effects, such as "brown heart," became noticeable. Thus where the percentage of carbon-dioxide exceeded 15 per cent., "brown heart" disease manifested itself.

For best results with gas storage, the fruit should be stored at a temperature just above the lower limit at which susceptibility to low temperature breakdown commences.

Research Work Proposed by Department of Agriculture.

I shall now conclude by referring to the research work which our Department is about to commence. The first matter to receive our attention will be to investigate the effect of low temperatures on our varieties of various fruits, and to determine, in particular, if various cold storage diseases may not really be, in some form, low-temperature breakdown. For this purpose we have had constructed twelve experimental chambers, the temperatures of which will be automatically controlled to any degree. Owing to the importance of humidity, especially for the storage of fruits liable to mould attack, the chambers have been designed so that the degree of humidity may be automatically controlled within very small limits.

Finally, in view of the importance of the gas storage experiment, the chambers have been constructed so that they may be adapted to carrying out work along these lines.

It is hoped that with this apparatus it will be possible to gradually accumulate information of a fundamental nature and of practical value.

A GARDENING BOOK.

The Australian Gardener, by Leslie H. Brunning, 21st edition, 544 pages, price 7s. 6d. net; from Robertson and Mullen Ltd.

That this compendium on gardening has now reached the 21st edition is proof that it needs no introduction to Australian gardeners. To speak in terms horticultural, it is difficult to know whether it should be classed as a perennial or as a hardy annual. The latest edition is bigger and better than before; among the additions is a useful section on layering, budding, and grafting, and notes on new varieties have been added throughout.

The home gardener, especially the novice, will find the book a constant source of information on all matters relating to the successful cultivation of flower, vegetable, and fruit gardens.

In the arrangement of the book the author has used the alphabetical method wherever possible, and this, combined with the detailed index, makes ready reference possible.

The illustrations, printing, and binding are in keeping with the excellent character of Mr. Brunning's book.

CONSERVATION OF FODDER ON DAIRY FARMS.

By A. J. Gill, Senior Herd Tester.

Even to the person who knows little about farming, one particular defect in our farming methods is most striking, and that is the failure to conserve fodder for stock.

Along some rural roads in the springtime grass may be seen on either side waving in the wind, axle high, and if one were to ask what will become of it, one would be told that it will dry off in the hot weather and disappear. Maybe some months later on that same road one will find the ground almost bare, with sheep and cattle there, striving to get sufficient food to keep them alive.

During the drought of 1914 in one of the most fertile districts of Victoria, large numbers of cattle and sheep died, and valuable dairy herds were almost completely wiped out. If a drought were to occur next year, a similar catastrophe would happen again. No provision has been made for a possible time of shortage, though in many parts of this district the grass grows luxuriantly, and it is only necessary to shut the stock off from a paddock for a few weeks in the springtime, in order to save tons of beautiful meadow hay.

In other parts of the world, not so favorably situated, stock is stabled and fed during the severe winter months. Here, in Victoria, if we have no rains for a few months, there is always grave fear that thousands of sheep and cattle will die of starvation. This should not be, for our lean years are preceded by years of plenty. One would naturally think that one drought experience would be sufficient, because a farm in time of drought is a picture that can never be forgotten—starving animals wandering round the paddock, picking up odd leaves, pieces of bark; poor brutes with gaunt frames and sunken eyes and staggering gait, growing weaker daily, until one morning they are unable to rise.

But, somehow or other, our farmers are particularly optimistic; they trust that droughts are a thing of the past as far as they are concerned, and so they go on. True, we have land-holders who store fodder. Mr. Wettenhall, of Carr's Plains Sheep Station, has sheds capable of holding 1,500 tons of chaff. Mr. Baillieu, Torrumbarry Station, near Echuca, stores silage and hay for his sheep. Mr. Maloney, the owner of the champion herd in this year's Standard Herd Test, though on an irrigated area, stores 1 ton of hay for each cow on the farm. But, unfortunately, these men are exceptions. The majority of land-holders make very little or no provision for the periods when food may be scarce.

Now, perhaps to dairy farmers more than any other land-holder, is the conservation of fodder a vital factor. It is to them the key to success. Not only does it mean insurance against droughts; it also means a regular supply of food throughout the year for stock, which results in a maintained output of dairy produce, and makes the farmer to a consequent extent, independent of the seasonal changes. In other words, his production will not be governed entirely by weather conditions, as is usually the case.

We know that if we are to build up and retain an overseas market for our dairy produce, we must be able to guarantee a regular supply. Our inability to guarantee a regular supply every season is, to my mind, at the present time, one of our weaknesses, and we shall not be able to remedy it until we have learned to conserve fodder. It should be the aim of every farmer and land-holder to have on hand, not only a reserve supply against drought, but also a quantity sufficient to maintain the condition of his stock throughout the year, as well as enough to supplement the pasture when it commences to go off, and during spells of inclement weather when a little hand-feeding is necessary. It must be remembered that condition lost is money lost.

Naturally, the farmer will ask, "If I am to conserve fodder, which crops will give me the best results?" Every farmer should be concerned about growing crops that will not only produce the greatest weight per acre, but also those that will supplement one another most advantageously. It is necessary, therefore, to take into consideration the feeding value of certain crops, as well as the weight yield per acre.

The Best Fodder Crops.

The secret of successful feeding is the correct balancing of the foods. Balancing of foods means the blending of different varieties, so that animals may receive correct amounts of required nutrients. Therefore, some knowledge of the composition and feeding values of the different fodder crops is necessary. The fodder crops most familiar in Victoria are: oats, wheat, barley, rye, lucerne, clover, grasses, maize, Japanese millet, and sorghums. The first two named—oats and wheat—are frequently grown for hay, sometimes separately, sometimes mixed.

A milking cow requires 1 lb. of digestible protein or flesh-forming constituents to every 6 lb. of digestible carbo-hydrates, or energy- and heat-giving constituents. This is what is meant when we say that her nutritive ratio is 1 to 6.

Hay—Oaten and Wheaten.

In comparing oaten with wheaten hay, we find that the oaten has a nutritive ratio of 1 to 10, wheaten 1 to 13; thus oaten hay is a more valuable fodder than wheaten. One ton of oaten hay contains 100 lb. of protein, 979 lb. of carbo-hydrates, 34 lb. of fat. A ton of wheaten hay contains 80 lb. of protein, 1,032 lb. of carbo-hydrates, 24 lb. of fat. The resulting crop from an acre of oaten hay (say 2 tons) would yield 100 lb. less carbo-hydrates, but 40 lb. more protein and 18 lb. more fat. Thus the oaten crop is higher in food units and considerably richer in protein, and consequently is the better food. I would not recommend the growing of a "shandy" crop for the simple reason that any given quantity of oaten hay is a more valuable food than a similar quantity wherein oats is replaced by wheat.

Maize.

Maize gives the greatest weight per acre; 15 tons is a very ordinary crop; on good soil it will yield 30 tons to the acre. One ton of green maize contains 22 lb. of protein, 260 lbs. carbo-hydrates, 9 lb. of fat. So from 15 tons we would get 330 lb. of protein, 3,900 lb. of carbo-hydrates, 135 lb. of fat. The nutritive ratio is 1 to 12.6, and therefore maize alone is not a balanced ration. The addition of another food is

essential to supply the deficiencies. Oaten or wheaten hay is what is described as a "broad" ration, and unsuitable to use with maize; so we must select a "narrower" food, that is, one containing a greater proportion of protein, such as lucerne.

Lucerne.

One ton of lucerne hay contains 276 lb. protein, 831 lb. carbo-hydrates, 36 lb. fat. Its nutritive ratio is 1 to 3. Probably lucerne would yield at the rate of 4 tons to the acre per annum, but taking the yield as 3 tons, it would give 828 lb. protein, 2,493 lb. carbo-hydrates, and 108 lb fat. If 3 tons of lucerne chaff be mixed with the 15 tons of green maize, or maize silage, the result will be 18 tons of perfectly balanced food, with a nutritive ratio of 1 to 6, and containing 9,895 food units. No other two crops will give these results. Maize and lucerne lend themselves particularly well to the making of a perfectly blended food, they give both quantity and quality. Wherever they can be grown, their cultivation is to be recommended. Maize stores exceptionally well as silage, either in the stack or silo. Lucerne can, perhaps, be best stored as hay.

Dairy-farmers should always remember this: 1 lb. of lucerne hay to 5 lb. of maize silage gives a balanced ration.

I have already mentioned that oaten hay has a nutritive ratio of 1 to 10, so this food also requires balancing. If vetches were sown with the oat crop, and the resulting yield was 2 tons of oaten hay and 1 ton of vetches, we would then have 3 tons of perfectly balanced food, and 4,269 food units per acre.

This is another point worth noting: 1 lb. of leguminous hay added to 2 lb. of cereal hay of average quality gives the correct nutritive ratio of about 1 to 6.

Meadow Hay.

Meadow hay, that is the hay made from our mixed pastures of clover and grasses, is in itself a properly balanced food, and therefore a valuable fodder.

It is unfortunate that in so many cases the farmer makes no effort to save his surplus pasture, and each year large quantities are wasted. This should not be so, and I would strongly advise every land-holder to make it a point to conserve all the meadow hay he possibly can. It is comparatively easy to stack, and when it has settled down, if the roof be raked down, so that the grass stems will lie straight downward, the stack will turn the rain, and the hay will keep in good order for years.

Silage Crops.

For crops to be preserved as hay, I would favour grasses, clover, lucerne, and oats. In districts not irrigated, where dry conditions may prevail, I would advise oats, maize, or one of the sorghum crops to be stored as silage. Wheat and barley may also be stored in this form.

Owing to its succulence, silage is particularly valuable for dairy stock. It is also a valuable food for fattening of young stock. Interesting experiments during the last twelve months have been carried out in this direction by Messrs. Dickinson Bros., of Sebastopol. Silage made from maize, wheaten and oaten crops, and also from shore thistles, was fed to the young stock, supplemented with concentrated foods to balance the ration.

A number of pepole make stack silage, but, if possible, some sort of silo is desirable. In some parts trench silos are made. These are cut out with plough and scoop, and are of varying dimensions. The earth which is scooped out to make the trench is used for covering and weighting.

The amount stored may be calculated by allowing 35 lb. for every cubic foot of silage. Maize is the ideal crop for silage; the solid stem allows close packing. Sorghum also makes fine ensilage. The only failures, or partial failures, I have noticed in the making of silage have been when the crops were cut while a little too green. Maize should never be cut for silage till the grain is hardening. I have seen very good silage made from maize after the crop had been frosted. Cereal crops intended for silage should be cut when they are at that stage at which such crops meant for hay are harvested, that is when the grain is milky. Japanese millet can be stored either as hay or silage. It has a higher feeding value than has maize or sorghum, but does not yield the same enormous weight per acre. It lends itself particularly well to grazing off, and keeps growing until the frosts appear.

Where it is possible to grow lucerne—and it will grow in most of our dairying districts—it is the most valuable fodder crop we can produce. It is rightly called the "king of fodders." It is rich in both protein and mineral matter, and can be used to supply the deficiencies of other fodders used on the farm.

Rye is suitable for greenstuff, but the chief use of the hay is quite other than the feeding of stock.

The Value of Straw for Feeding.

Sometimes the straw of oats, barley, wheat, and peas are used as fodder, especially during drought periods. The protein value of the straw from cereal crops is low, but it provides carbo-hydrates, the energy- and heat-forming constituents. When used as fodder during drought years, a little molasses is dissolved in hot water and sprinkled over it. This renders it palatable, and the molasses having laxative qualities, improves the dry feed.

For feeding, I would place oaten straw first, barley next, and wheaten last of the three cereals. Pea straw is the most valuable of the straws. It contains 4 per cent. protein, and has a nutritive ratio of approximately 1 to 8; therefore it is quite a valuable roughage, and well worth taking care of and preserving.

The Quantity of Fodder to Store.

When storing fodder, it should be remembered that 1 ton of hay will enable 20 lb. per day to be fed to one cow for just about four months. This is what would be termed a maintenance supply. If 10 lb. per day were fed, i.e., a well-filled kerosene tin night and morning, the ton would last about eight months. The usual maximum amount of silage fed to cows is from 30 to 40 lb. daily. If 30 lb. per day were fed, a ton would supply a cow for approximately two and a half months.

On dry areas, I would recommend the stacking and conserving of not less than 2 tons of hay (lucerne, meadow, or oaten hay) for each animal on the farm. If both hay and silage be stored, I would say 1 ton of hay and 3 tons of silage for each beast. Where only silage is stored, then I would suggest 6 tons to each animal.

In addition to storing food, the improvements of our pastures, and the supplementing of them by green fodder crops, must be studied. The great weakness, however, in farming methods, not only in Victoria, but throughout Australia, is the failure to conserve fodder. Storing fodder is, if I may so put it, the banking of money. It means more pounds of butter, beef, or mutton to the acre, freedom from loss by droughts, and a regular output.

PASTURE.

THE DAIRY FARMER'S MAIN CROP.

By Roy Thompson, Dairy Supervisor.

The Value of a Good Pasture.

The development of good pasture is one of the essentials in the successful management of a dairy farm. By the term pasture we mean any form of grass, &c., grown for the feed of cattle and sheep. The best pastures in this State are those where there is a mixture of the natural grasses and clover. Analyses of pastures reveal a great variation of quality, particularly in the essential milk-making element, "protein." Where there is a dearth of clovers (one of the plants richest in protein) their growth can be stimulated by top-dressing, or the lack can be supplied by feeding concentrates to the stock.

Good quality pasture is approximately a balanced ration for the dairy cow, that is, if the full quantity required can be obtained, the quality is sufficient to enable her to produce to her maximum capability. Cows give their best milk flow when receiving a balanced ration. This is particularly true when the food is in a succulent form, as is green pasture.

The sum of a pound spent in concentrates to feed a dairy cow grazing on poor pasture may not return an equal amount to the farmer, but if the amount be spent on top-dressing—particularly reconstructed pasture—it can be expected to return the initial oulay plus an infinitely improved pasture. An average dairy animal will eat from 12 to 14 tons of green feed in a year, or its equivalent in hay. To produce her maximum flow of milk a cow requires in her food the elements of nutrition for her body maintenance, for milk-making, for the calf she is carrying, and to help in the building up of reserve condition. To supply these wants is the dairy farmer's obligation, and good pasture is the cheapest form in which they can be met.

In Australia pasture is and will be for years to come the mainstay of dairy farming. The amount of cultivation a dairyman can provide for fodder growing is governed by the labour available and the cost of producing and handling the crop.

When, on those farms where the labour available is limited, any land is being broken up, the likelihood that it will in the future be turned over to pasture should be remembered.

Economical production demands unlimited quantities of farm-grown green crops; pasture is the main one, and it can be grown more cheaply than can any other crop. On dairy farms where the production is in the form of butter fat, it is not likely that a financial success will be

made if much expense is incurred in purchasing fodder to feed the dairy herd; only after a sufficient quantity of bulk food is produced on the farm will it pay to purchase concentrates to feed cows. On an average farm, stock obtain a large proportion of their sustenance from pasture grazing. In order to ensure the greatest amount of production, keen dairymen are supplementing grass supplies by the use of green oats, maize, millet, red clover, and pasture hay.

Advantages of Subdividing the Farm.

A common practice on many dairy farms is to allow the cows to wander over the whole farm, with the exception, perhaps, of one or two smaller cultivation paddocks. This results in a great loss of valuable food, for, during the spring months the stock are unable (unless the place is greatly overstocked) to consume the grass as fast as it grows. It is not generally known that young grass, in addition to being succulent and easily digested, is richer in protein than at any subsequent period of growth. As it matures, there is a development of fibre, with a loss of leafage, which carries this essential milk-making element.

When pasture paddocks can be grazed in rotation, there is more continuous growth of the young leafy material that is so relished by dairy cows, and therefore develops the maximum appetite. Short pasture up to 4 or 5 inches in height is an ideal food for a dairy cow.

English experiments show that the dry material of hay made from monthly cuttings of pasture has an exceedingly high protein content; the average of several cuts was twice as high as that in seed oats, and approximately three times that of grass hay when grown in the usual way. The result of this experiment suggests the wisdom of feeding off pasture paddocks in rotation, in order to obtain an extended period of leaf-growth.

The practice of allowing stock to wander over a farm at will is one of the main causes of the depreciation of grass-lands. This is especially true of those that contain any quantity of inferior grasses. While pastures are kept short, and a fresh growth maintained, stock will relish almost all grasses, but when feed becomes plentiful they will eat mainly the better varieties; the consequence will be that the inferior ones seed and multiply at a greater rate, while the better quality grasses, being kept short, are gradually eaten out.

One of the several benefits to be derived from subdividing a farm is that by this means a dairyman can ascertain which grasses, or mixtures of grasses, possess the greatest carrying capacity, that is, the greatest butter-producing qualities, in that particular field or district. By the use of varying mixtures of grasses in different paddocks it will be possible to note which make the quickest and strongest growth, and which show the greatest signs of permanency. The returns from cows, when pastured in those paddocks, will be a true indication of their value.

Subdivision of a farm into paddocks of 5 to 10 acres, each with easy access to plenty of good drinking water (if possible in every paddock), an annual top-dressing with the artificial manure which has been proved most suitable, grazing the paddocks in rotation, followed by the frequent use of drag harrows to spread cow droppings, and the cutting of all surplus grass at the flowering stage for hay for future use, will go a long way towards making a success of dairying where labour is hard to obtain.

A Striking Illustration.

Mr. W. T. Jephson, of Stacey's Bridge, near Yarram, is a staunch advocate of subdivision and top-dressing of pastures. These practices, together with systematic testing of cows, he thinks are the essentials for successful dairy-farming. The following particulars supplied by him are of interest:—

Mr. Jephson's farm consists of an area of 71 acres of good dairying land, carrying a splendid sole of rye grass and clovers. Previous to top-dressing and the sub-division of the property, a small area of lighter land was rented for the purpose of growing oaten hay for feeding to the herd. The dry cows were grazed out. Five acres of the home farm were devoted to maize-growing for green feed. The remaining portion of the farm was divided into two paddocks. Three years ago, however, Mr. Jephson commenced subdividing his land into smaller paddocks, and top-dressing them with superphosphate. The property is now divided into fourteen paddocks, varying from 3 to 8 acres in extent. Five acres of maize is still grown each year. All the pasture land is top-dressed annually with superphosphate at the rate of 1 cwt. per acre. No oaten hay is now grown, and a fine stack of grass hay is reserved for use in case of emergency.

With the exception of about 8 acres of cow grass, no grasses have been sown on the property during the past five years, although a considerable amount of subterranean clover has appeared in the pasture since it was first top-dressed. During the past two years all the cows, together with a number of young cattle, have been grazed on the farm continually.

Mr. Jephson is a foundation member of the Yarram Herd Testing Association established five years ago, and the result of his first year's testing from 30 cows was an average of 247.41 lb. fat per cow. In that year he paid out £90, or £3 per cow, for fodder, mostly in the form of concentrates.

In the year just completed, 1928-29, the herd returns were 385.1 lb. fat per cow from 29 cows; the outlay for feeding was £57, or approximately £2 per cow; this sum includes the purchase of 3 tons of superphosphate for top-dressing. This average increase of 137 lb. fat, following on a decreased expenditure of £1 per cow, represents, with butter at 1s. 6d. per lb., a net increased return of approximately £4 10s. per acre.

The whole of this increase is not claimed to be due solely to subdivision and top-dressing of the farm. A pure Jersey bull from a high-producing dam, was brought into the herd, and the progeny of this bull have shown higher production than the best of the original grade cows, a number of which are still retained. Until these are replaced the full benefit of the bull's influence on the herd will not be realized. At the same time Mr. Jephson claims that, judging by the increased returns from the original grade cows remaining, at least 50 per cent. of the increased return is due to better handling of the pastures by subdivision, and to the benefits following on top-dressing. It would seem, therefore, that the top-dressing of pastures with suitable manures and a stocking of the paddocks in rotation is of equal importance to the use of a high-grade sire and the culling of low-producing cows. If the pastures are allowed to deteriorate, the benefits to be derived from better-class animals will be more or less lost.

THE CALF CLUB MOVEMENT.

CLUBS IN UPPER MURRAY DISTRICT.

By George Walker, Dairy Supervisor.

The combined Shires of Towong and Upper Murray, which include that area of country from the junction of the Mitta Mitta and Murray rivers at the Hume Weir to the headwaters of the Murray, constitute what is spoken of generally as the Upper Murray district. One can leave the Hume Weir and follow the valley of the Murray for over a hundred miles to Biggera, beyond which there is no road. Biggera is a Closer Settlement area, some fifty miles from Mt. Kosciusko, the highest mountain in Australia.

This valley, hemmed in on either side by hilly country, widens out in places of rich alluvial flats many thousands of acres in extent; at others the hills narrow into what might be called gorges, and in these gorges the road has to be cut in the hillside.

Section Leaders—Corryong.

Some of the wider expanses of flats, notably at Talgarno, Burrowye, Walwa, Tintaldra, Towong, and Biggera, were originally station properties selected by the early pioneers of the district, whose fat bullocks made a name for the district which is still remembered.

Introduction of Dairying to the District.

It is only in comparatively recent times that dairying has been carried on to any extent in this country. Its introduction was very gradual, for by many it was regarded as only a sideline to grazing; they could not get away from the idea that a cow is essentially an animal from which to breed calves of a beef strain in demand by butchers, and then, as she grows old, to be sent to the butcher herself.

Even there now one finds herds of Hereford and other beef breeds, the calves from which seem to be valued more than the butterfat produced by their mothers. That such practice is not the most profitable is well known to those who have given any thought to the dairying industry; they are well aware that income will be supplemented more by the sale of pigs than by the sale of steer calves.

It is fortunate that the Upper Murray district is served by two progressive co-operative companies in the Cudgewa and Walwa Dairy Companies. It was due to the interest taken by directors of the former, whose output is some five hundred tons of butter a year, that the first Herd Testing Association (of which there are now five units in the district) was made possible. This association was organized in 1926. Herd testing has since played an important part in the development of the industry by arousing interest in breeding and feeding for butter-fat production and the introduction of a better class of dairy cattle to the district.

Formation of the First Calf Club.

It was with these objects in view, also in the belief that by instruction a child can be fitted to become a better farmer than if left to potter along in the old way that was "good enough" for those that went before him, that led to the formation of two Children's Calf Clubs in the district in 1928—one at Corryong and one at Walwa.

The Corryong Club comprised sixteen boys and seven girls. A committee of six boys and six adults was elected and a club leader was

Calves Paraded at Walwa on Judging Day.

appointed. A set of rules was drawn up and affirmed, the chief of these rules are as follows:—

Any boy or girl under the age of eighteen years may be accepted as a member.

Calves born between 31st July and 1st November only may be entered.

Entries to be made within fourteen days of birth.

Calf to be fed new milk for two weeks, half new and half skim for two weeks, followed by skim milk; no restriction is placed on the feeding of calf-meals or concentrates, providing that an account of same be kept by the member.

Calves to be judged on a date to be fixed, but not later than 1st April in ensuing year.

Each member of the Club entered a calf for competition. All competitors were expected to feed and care for their calves themselves. Those who could obtain pure-bred animals were encouraged to do so; the majority, however, entered grade calves which, in some cases, were very good specimens of dairy type.

Four pure-bred calves and two grades were donated to the Club by local breeders, and sold to members for £2 each, payable in twelve months from date of purchase. Most members, however, were given calves from their parents' herds.

At Walwa, where the members were drawn from two schools—Walwa, in Victoria, and Jingellic, across the Murray in New South Wales—a club was formed on similar lines to those followed at Corryong, with the exception that entries were limited to grade stock, pure-breds being unprocurable.

Judging took place at Corryong on the 2nd March, when 22 of the 23 competitors were exhibited in a ring formed in a shady part of the school grounds. In some cases the calves had to be brought to the school by motor truck. One competitor lived fifteen miles away from the school. Donations to the amount of £11 13s. were received to provide prizes for the winners. Portion of this amount was awarded to the winners in the various sections, and the balance was pooled and

Ian McIntosh with his Grade Jersey Calf—1929 Champion—Corryong.

allotted to the other competitors, according to the number of points awarded them by the judges. The juvenile owner of the champion calf received 33s., while no competitor received less than 6s. 3d.

Judging day at Walwa was on the 9th March. Unfortunately, the weather was exceptionally hot and only eleven of the fifteen calves entered were exhibited. Local residents donated £7 8s. for prizes, and trophies for first, second and third—a gold medal, a fountain pen, and an electric torch—were awarded, and the balance divided amongst the other competitors as at Corryong.

Mr. W. J. Yuill, Senior Dairy Supervisor, acted as judge at Corryong, while that office at Walwa was filled by Mr. A. Stephen, also a Senior Dairy Supervisor. Points were allotted for:—Dairy type; appearance and development; ring behaviour. Keen interest in the judging was shown by both parents and children.

The general opinion among the parents was that the practical lessons taught the children in this manner had been well worth while, and would increase their knowledge of the correct treatment of young stock,

and the necessity for concentrating on dairy breeds and better feeding methods. One man said that if the competition had done nothing more than make his boy take a greater interest in feeding calves he was well repaid for any financial aid he had given the movement.

Points Allotted to Each Competitor—Upper Murray Club.

Name of Competitor.	Breed of Calf.	Born.	Best Type and Breed.	Appearance and Development.	Ring Behaviour.	Aggregate Points.
Possible Points ..	.. ..	.. ..	50	30	20	100
Ian McIntosh ..	Grade Jersey ..	29th August	48	27½	19	94½
Murray Jarvis	Pure Shorthorn	17th August ..	47	28	17	92
Will McInnes ..	Grade Jersey ..	12th August ..	48½	25	18	91½
Norman Jarvis	Pure Shorthorn	20th October ..	46½	27½	17½	91½
Josephine McIntosh	Pure Jersey ..	1st August ..	46	26½	17½	90
Alwyn Lloyd ..	Grade Jersey ..	22nd August ..	47	26½	16	89½
Jeoff Jarvis ..	Pure Shorthorn	26th September	45	26	17	88
Mary Paton ..	Grade Friesian	25th September	46½	22½	18½	87½
Edwd. Bennetts ..	Grade Jersey ..	28th September	46	25	16½	87½
Walter Bennetts ..	Grade Jersey ..	31st August ..	45½	24½	15½	85½
Betty Sambells ..	Pure Shorthorn	12th August ..	44½	25	15½	85
Beryl Robertson ..	Grade Jersey ..	5th August ..	45½	24	15	84½
Stan. Albert ..	Pure Jersey ..	23rd October ..	45	24	15½	84½
Alex. Masters ..	Grade Jersey ..	15th September	44½	21	18½	84
Maru Robertson ..	Grade Jersey ..	6th September	44½	22	15½	82
Chris. Sambells ..	Pure Shorthorn	16th August ..	44	23½	14½	82
Agnes Heyenga ..	Pure Shorthorn	13th September	44	23	14½	81½
Mervyn Whitehead	Grade Friesian	17th September	44½	23	13	80½
Gladys Masters ..	Grade Jersey ..	20th September	43	19	15	77
Laurie Masters ..	Grade Jersey ..	28th August ..	43	19	14½	76½
Reg. Dugan ..	Pure Jersey ..	16th August ..	48	28	*	76
Jack Harris ..	Grade Jersey ..	22nd September	43	18	14½	75½
Alan Seaton ..	Grade Jersey ..	20th August ..	Died during season			

* Could not be controlled by competitor.

First, Second, and Third Prize Winners—Walwa.

Points Allotted to Each Competitor—Walwa and Jingellic Club.

Name of Competitor.	Breed of Calf.	Born.	Best Type and Breed.	Appearance and Development.	Ring Behaviour.	Aggregate Points.
Possible Points ..	.. ..	.. ..	**50**	**30**	**20**	**100**
Amy Coughlan ..	Grade Jersey ..	.. ..	47	27	17	91
Tom Barlow ..	Grade Jersey ..	.. ..	46	27	16	89
Athol Purss ..	Grade Shorthorn	.. ..	41½	29	18	88½
Ray Nugent ..	Grade Jersey ..	.. ..	41	29	18	88
John McVean ..	Grade Jersey ..	.. ..	41½	28	18	87½
Kevin Schmetyer ..	Grade Shorthorn	.. ..	42	27	18	87
Ernie Purss ..	Grade Jersey ..	.. ..	42	26	17	85
Claudia Wilson ..	Grade Jersey .	.. ..	40	27	17	84
Will O'Keefe ..	Grade Jersey ..	.. ..	42	26	16	84
Fay O'Keefe ..	Grade Jersey ..	.. ..	40	26	16	82
Ian Coughlan ..	Grade Jersey ..	.. ..	40	25	16	81

RIND MARKINGS OF CITRUS FRUITS.

By S. A. Cock, Citriculturist.

Owing to the great number of markings occurring on the rinds of citrus fruit in many of the citrus areas of the State, experiments to ascertain the cause and arrive at some means of prevention were begun in 1925-26 at Shepparton. It was thought that citrus thrips were probably responsible for most of the injuries, and therefore tests were made with various insecticides, but they proved ineffective in lessening the injury.

In the 1927-28 season, at the grove of Messrs. A. J. Wood and Sons, Tongala, six trees were protected with hessian screens to the height of each tree. These protecting screens were in position from the time the trees began to flower until the fruit matured in August. This experiment suggested that wind caused most of the injuries to the rind of the fruit, and that shelter belts were necessary for the protection of both trees and fruit.

Details of the experiments conducted during both the 1925-26 and that of the 1927-28 seasons, together with the results, were printed in this *Journal* for September, 1928.

The test made with screens during the 1928-29 season was a more extensive one than that of 1927-28, sixteen trees being protected. The experiment was carried out by Mr. W. A. Rolfe, Citrus Supervisor, and the results have confirmed the opinion formed during the previous season that the injuries were caused mostly by the wind, and it is not thought that any further experiments are necessary. Mr. Rolfe's report is printed below.

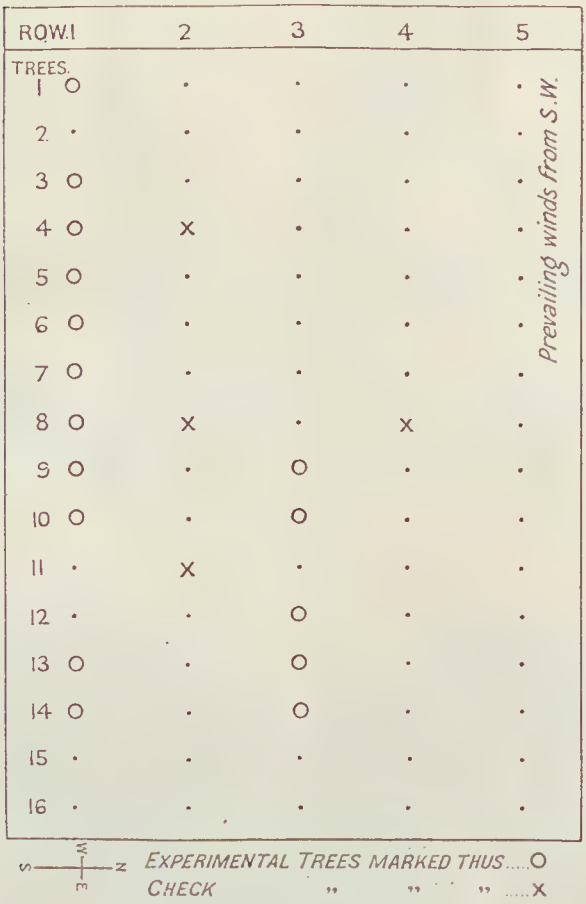
It is desired to thank Messrs. A. J. Wood and Son for their kindness in placing trees in their grove at the disposal of the Department for the purposes of the experiment during both the 1927-28 and the 1928-29 seasons.

Report on Results from Screen Tests during 1928-29.

Last season's experiment, which consisted of six screens erected around citrus trees during the spring of 1927, and removed during the winter of 1928, demonstrated that the rubbing of leaves and twigs on the fruit caused the large majority of marks on the rind of the fruit.

The purpose of this season's experiment was:—

1. To check the results obtained by the previous experiment.
2. To find out the time of the year during which most of the marking occurred.



A plan showing the position of the protected trees and of the check trees is given above.

During October and early November, 1928, screens were erected around sixteen trees in the grove of Messrs. A. J. Wood and Son, Tongala. The screens were built of hardwood and softwood, and unbleached strong calico covered the framework. Each screen was erected to the

height of the tree that was to be screened from the wind, and protected it on all sides. Two screens were dismantled every month, the last being removed in July. The object of this removal of screens at different times was to ascertain as far as possible the month during which most of the rind-marking occurred.

On the 21st and 22nd of August, 1929, the fruit from all the experimental trees and from the check trees was picked and sorted into the three grades—"special," "standard," "plain." "Special" was fruit without any blemishes; "standard" was that having only slight blemishes; and "plain" was fruit badly marked.

In the table on page 596 it is shown that trees 1 and 3 in row 1 yielded a higher percentage of standard than of special fruit, notwithstanding that they were screened until the first week in January.

There is, however, a reason for this. On 22nd December, 1928, a severe cyclone blowing from the south-west damaged all the screens to a certain extent, but wrecked those around the trees in question to such an extent that they were not re-erected; and, in addition to being deprived of their cover a few days before it should, in the ordinary course, have been removed, they were subjected to a buffeting from the screens which were blown upon them. The percentage of marked fruit on these two trees is an indication of the effect of a heavy wind on the quality of the fruit.

It will be seen from the table that the longer the screens were left around a tree, the higher was the percentage of special fruit. A comparison between the check trees and the trees from which the screens were first removed (trees 13 and 14, row 3; screens dismantled first week in December) suggests that most of the damage by the wind is done during November and December.

The young fruit at this time of the year is just forming, and is consequently very tender, and so more easily marked. Also, owing to the fact that the fruit is small and light in weight, it is held almost upright amongst the leaves of the tree. As the fruit grows, its weight brings it down away from the leaves; thus the chances of contact with leaves are not so great when the fruit is six weeks old as in its earlier stages.

The results of the 1928-29 experiment confirm the opinion formed from the experiment of the previous year, that the wind causes much disfigurement to the rind of citrus fruit.

As was noted in the 1927-28 tests, the screened trees showed a better green colour than that of the unscreened trees, which suggests that shelter for a grove means healthier trees. The lighter yield on the screened trees may be accepted as the result of chance, for throughout the grove the yields from the trees varied considerably, from very light to fairly heavy.

In these days of keen competition, it behoves citrus growers to produce fruit of as high a standard as possible. Much adverse comment is caused by the unsightly blemishes on the rind of oranges and, although they do not affect the quality of the pulp, they do affect the marketable value of the fruit.

The lesson from the experiments carried out during the past two seasons is that every citrus grove should be protected by wind-breaks.

Table Showing Numbers of Fruits—Special, Standard, and Plain —Picked from Each of the Trees in the 1928-29 Experiment.

Date Screen Taken Down.	Tree.	Row.	Counts of Fruit and Percentages made on 21st–22nd August, 1929.			
			Special.	Standard.	Plain.	Total.
December ..	13	3	420 (63%)	240 (36·6%)	7 (1·6%)	667
(1st week)	14	3	206 (56·4%)	150 (41·1%)	9 (2·5%)	365
January	1	1	32 (37·2%)	47 (54·7%)	7 (8·1%)	86
(1st week)	3	1	26 (44·8%)	30 (51·7%)	2 (3·5%)	58
February ..	4	1	92 (57·5%)	62 (38·8%)	6 (3·8%)	160
(1st week)	5	1	213 (64·7%)	107 (32·5%)	9 (2·7%)	329
March	6	1	95 (66%)	46 (32·4%)	3 (1·6%)	144
(1st week) ..	7	1	174 (69%)	76 (30%)	2 (1%)	252
April	8	1	90 (56%)	67 (42%)	3 (2%)	160
(1st week)	9	1	51 (67%)	24 (31·6%)	1 (1·3%)	76
May	10	1	80 (81·6%)	16 (16·3%)	2 (2%)	98
(1st week)	13	1	170 (67·7%)	77 (30·7%)	4 (1·6%)	251
June	12	3	163 (67%)	80 (32·4%)	4 (1·6%)	247
(1st week)	10	3	170 (57·6%)	110 (37·3%)	15 (5·1%)	295
July	9	3	250 (76·2%)	73 (22·3%)	5 (1·5%)	328
(1st week)	14	1	17 (94·4%)	1 (5·6%)	Nil	18
			Check Trees.			
August	8	2	170 (44%)	200 (51·9%)	16 (4·1%)	386
	8	4	123 (29·7%)	279 (67·3%)	12 (3%)	414
	11	2	176 (42·1%)	240 (57·4%)	2 (·5%)	418
	4	2	110 (40·1%)	160 (58·4%)	4 (1·5%)	274

RED SCALE ON CITRUS TREES.

TESTS WITH WHITE OIL EMULSIONS.

By S. A. Cock, Citriculturist.

Various brands of white oil and white oil emulsions are being sold as scalicides for the control of red, black, and brown scale insects. The agents and manufacturers of these oils make it a practice to send samples to the horticultural division for experiment. The testing of them by field officers attached to the division has hitherto not been attended with satisfactory results, as frequently other duties intervened, and thus prevented the work being performed at the right time.

This year, in order that the tests of the various preparations might be as fair as possible, it was resolved that they should be made at

TABLE I.—SHOWING RESULTS OF SPRAYING TESTS FOR RED SCALE AT KYABRAM.

Trees sprayed, 12th March, 1929; examined, 27th March, 1929.

Table compiled by G. T. Levick, B.Agr.Sc., Assistant to Entomologist.

Row No.	Oil used.	Price.	Temperature at Spraying.	No. of trees sprayed with 50 gallons.	Percentage of live Scale before Spraying.	Remarks.	Percentage of live Scale after Spraying.	Percentage of live Scale killed by Spray.	Remarks—Spray injury.
		s. d.			%		%	%	
2	Vacuum Oil Co. Red Oil	3 4	86° F.	20	64	1 gallon of oil and 4 oz. soap mixed with 1 gallon water and poured into 48 gallons	24	62·5	Some leaf drop. Slight injury to underside of some fruits
3	Vacuum Oil Co. Special Spraying Oil	6 0	88° F.	19	62	1 gallon oil mixed with 1 gallon water and added to 48 gallons	18	71	Fairly heavy leaf drop. Slight injury to underside of some fruits
4	Cooper's Alboleum	7 0	95° F.	33	57	,, ,, ,,	20	64.5	Very slight leaf drop. No injury
5	Pannifex and Co. Volck	8 0	90° F.	22	44	,, ,, ,,	21	52	No leaf drop or injury
6	Vallo White Oil	6 3	99° F.	?	39	,, ,, ,,	15	61	,, ,,

Barcelona Grove, Kyabram, which was found to be infested with red scale. Mr. B. P. Ventura, the owner, kindly placed the grove at the disposal of the Department.

The date selected for spraying (12th March, 1929) proved entirely satisfactory for a thorough testing of the oils, a light, hot northerly wind blowing all day, with a temperature ranging from 86 deg. Fahr. at 9 a.m. to a maximum of 99 deg. at 5 p.m. The time of day at which the sprays were applied was determined by lot. No. 1 was begun at 9.30 a.m., No. 2 at 11 a.m., No. 3 at 1.30 p.m., No. 4 at 3 p.m., and No. 5 at 4.30 p.m. The pump was thoroughly emptied and cleaned before each individual spraying, and the whole of the spraying was performed by the same two men, who acted under instructions from myself. Representatives of the oil companies approved of the general method of spraying to be carried out. The pump worked at a power equal to 250 lb. to the square inch, and the trees were thoroughly wetted with a rough cutting spray. A representative of each oil company mixed and prepared the spraying mixture supplied by his company. The entomologist (Mr. French) and his assistant (Mr. G. T. Levick) were present to take checks of live scale before spraying began; and in conjunction with myself took two samples of all oils used, the sample of the oil of each company being sealed in view of its representative. These samples are at present held at the laboratory of the Department.

The following table gives details of the several tests and of the results of the scale-kill as ascertained fifteen days following the spraying; the nature of any leaf injury caused by any of the mixtures is also recorded.

The purpose of including red oil in the test was to ascertain how the results it gave would compare with those from white oil.

On the 25th June, approximately three months after the spraying tests were conducted, another examination of the trees was made by the entomologist and his assistant. The following table gives the result of their investigation:—

Table II.—Showing the Percentage of Live Red Scale from 25th June, 1929, on Citrus Trees Treated Three Months Previously. (Table Compiled by G. T. Levick, B.Ag.Sc., Assistant to Entomologist.)

Sample.	Treatment.	Percentage Live Scale.
1	Vacuum Red Oil	8
2	Vacuum White Oil	3
3	Cooper's White Oil	20
4	Volck White Oil	5
5	Vallo White Oil	18

As all the oils used are proprietary brands no comment is made on their efficiency. Growers from time to time have requested information regarding the results of the experiments, and it is in response to those requests that this information is published.

EXPERIMENTS IN CINCTURING NAVEL ORANGE TREES.

By S. A. Cock, Citriculturist.

For some years past, citrus-growers in many parts of the State have been practising cincturing on individual navel orange trees, but there is great conflict of opinion as to the value of such practice.

ROW. 1	2	3	4	5	6	7	8
TREES.							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11			O		O		
12		X	X		X	X	
13		X	X		X	X	
14							
15							
16							

S — N — Z

CINCTURED TREES MARKED THUS X

CHECK " " " .....O

As no definite record of the yields of trees subjected to this treatment has been kept by the growers, the citrus branch of the horticultural division last season began, at the grove of Messrs. A. J. Wood and Son, a series of tests which will extend over a three-years' period. These tests were made on eight navel orange trees. During the coming season and that following, it is proposed to carry out cincturing experiments at Mildura, Swan Hill, Rochester, Shepparton, Cobram,

and Wangaratta. In each of these districts, twelve trees will be selected in a grove where trees of shy-bearing habit are growing; six of these will be cinctured and six used as checks.

The results from the past season's experiment as carried out by Supervisor W. A. Rolfe are not conclusive, but it has been thought advisable to publish them for the benefit of growers interested in this phase of grove practice.

Results of Cincturing Experiments 1928-29.

The trees experimented on were Washington Navels, which were of shy-bearing habits. These trees and also the check trees were typical of those in the grove. The blossoming of all was good.

In October, 1928, four trees were cinctured (single cut) while still in bud. In November, 1928, four trees were cinctured (single cut) when petals were falling.

A plan of the treated and the check trees appears on page 599.

The fruit from all the cinctured and the check trees was picked during August last. A count gave the following results:—

Row.	Tree.	No. of Fruits.
	Trees Cinctured during October, 1928.	
3	12	247
3	13	667
4	12	120
4	13	514
(Check) 4	**1**	**105**
	Trees Cinctured during November, 1928.	
6	12	376
6	13	543
7	12	503
7	13	305
(Check) 6	**11**	**360**

The trees cinctured in October whilst in bud gave an increase in crop. In the case of those cinctured in November when the petals were falling, there was not such a noticeable increase.

The health of the cinctured trees has not in any way been affected by the experiment.

RESULTS OF POTATO MANURIAL TRIALS, 1928-29.

By J. T. Ramsay, Potato Expert.

The results of the potato field trials conducted by the Department in various parts of the State are herewith presented. With the exception of Millbrook, the trials are confined to variations in manurial treatment, the object being, of course, to determine which quantity and combination is likely to prove most beneficial and profitable. Seasonal weather fluctuations play a very important part in influencing the results, necessitating continued experiments over a period of years.

The past season for most of the Victorian potato districts was most unfavorable. The early part of the growing period was generally too dry, with the result that crops were stunted to such a degree in their early development that they never recuperated. The consequence was that the great majority of crops finished the maturation period with very light yields. In some cases, indeed, little more weight per acre was harvested than was planted.

On isolated areas some excellent crops were lifted, but it is safe to say that, for the most part, the potato crop this year was not a profitable one to Victorian growers, in spite of the apparently high prices ruling for the season.

Collar Stem Rot.

A contributing factor of importance governing the yield of the last season's crop was the prevalence of *Rhizoctonia solani* (collar stem rot).

In some districts the excessive damage done by this fungus disease made the lifting of the crop hardly worth while. In all probability many growers will be tempted with the high price current to dispose of as many of their sound tubers as possible, and use much seed of inferior grade and soundness.

That being so there is every probability of seeing considerably increased outbreaks of *Rhizoctonia* in next season's crops. A strong note of warning is given here that an effort should be made to treat all seed to be planted next season, so that some check may be given to this increasing and damaging disease.

So seriously does the Department view the damage by this fungus that test plots have been instituted in the Western District. These really are more in the way of demonstration than experimentation.

A positive and material check to the disease can be given by the formalin treatment. This consists of immersion of seed tubers for 1½ hours in a solution of formalin at the strength of 1lb. formalin to 30 gallons of water. The treatment is inexpensive, the labour cost being

practically the only material expense involved. Dipping should be done prior to cutting, and if the seed has to be kept any time before planting, as it will be in most cases, it should be allowed to thoroughly drain.

The 1929 Results.

In spite of the adverse season, the application of fertilisers is again shown to be effective and profitable, as an analysis of the following results will show.

At Childers, near Thorpdale, in the Gippsland hill country, very substantial increases were again recorded, and the outstanding feature of these is the consistent repetition of the now well-known "6 and 1" dressing in heading the list of increases; no less than 150% improvement in yield over the no manure plot being recorded in its favor.

Detailed analyses of the results are given, showing costs, presented in various ways, which should be of the greatest interest and value to potato growers in the particular districts where the operations were conducted, and to those of the State generally, because the experimental stations—now eleven in number—embrace the majority of the different soils suited to the culture of the potato tubers. The fact that the past two seasons have been very unprofitable to growers in the main, enhances the value of the results of these investigations.

With increasing land values, higher labor costs, and added expense of implements, the economic pressure on the potato grower is becoming steadily heavier, and his only possible means of countering this pressure is to reduce his cost of production by increasing his yields from the same given expenditure. The greatest influencing factors towards this aim are good seed and cultivation, and correct manuring. The value of good seed from selected stock is becoming increasingly appreciated. The standard of cultivation is steadily improving. It is with the object of illustrating the benefits from correct manuring that these experiments are conducted and their results tabulated and presented, and, of course, they are also carried out by the Department for the education of growers who could hardly be expected to find time and means to devote to the somewhat intricate research work involved.

Results at Childers.

The Childers results, since the present standard variation of manures was applied there in 1923-24, have been remarkably consistent. In estimating the value of the crop for the past season £12 per ton has been taken. This, probably, is below the actual average price for the season, but it is high enough to throw into relief the profitable nature of the manurial applications. In the case of the Childers plots, the maximum difference in valuation per acre between the no manure crop and the heaviest yielding crop, i.e., the "6 and 1" dressing is no less than £37 19s. per acre, and this, after allowing for cost of manure to which £1 per ton on Melbourne prices has been added to cover cost of freight and cartage from Melbourne, and distribution.

Table I.—Results of Manure Trials on Potatoes at Childers (Thorpdale) for 1928-29.

Conducted on the farm of J. F. Humphries. Soil—clay loam.

Manures.	Market Tubers.	Increase from Manure.	Cost of Manure per Acre.	Cost per Ton Increase.	Increased Value per Acre.	Net Increase Value per Acre.	Per-centage Increase.
	T. C. Q.	T. C. Q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	%
1.—3 cwt. super. ..	4 3 2	2 1 3	0 18 9	0 9 0	25 1 0	24 2 3	100
2.—6 cwt. super. ..	4 12 3	2 11 0	1 17 6	0 12 8	30 12 0	28 14 6	121
3.—9 cwt. super. ..	5 0 0	2 18 1	2 16 3	0 19 10	34 19 0	32 2 9	135
4.—6 cwt. super., 1 cwt. pot. sulph. ..	4 3 2	2 1 3	2 13 0	1 5 3	25 1 0	22 8 0	126
5.—No manure ..	2 1 3	..	..	..	..	..	..
6.—6 cwt. super., 1 cwt. ammon. sulph. ..	5 5 0	3 3 1	2 14 3	0 17 5	37 19 0	35 4 9	150
7.—6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph. ..	5 2 0	3 0 1	3 9 9	1 3 4	36 3 0	32 13 3	145
8.—3 cwt. market garden manure ..	4 8 1	2 6 2	1 8 6	0 12 4	27 18 0	25 9 6	109
9.—3 cwt. basic phosphate	4 8 1	2 6 2	0 19 6	0 8 5	27 18 0	26 18 6	109

In the second Childers table, given hereunder, the detailed results from the nine manurial variations for the years 1923-24 to 1928-29 are given. Naturally, considerable difference in yield per acre for the various years will be noted; this, of course, is entirely due to the variations in rainfall during the years in question or to its incidence. It is interesting to note the range of variation in yield, as this is a graphic demonstration of the responsiveness of the crop to its influence.

Table II.—Results of Manure Trials on Potatoes at Childers (Thorpdale) for Six Years, Showing Average Returns for that Period.

——	1.	2.	3.	4.	5.	6.	7.	8.	9.
	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
1923–24 ..	7 10 0	8 15 0	8 15 0	8 15 0	4 15 0	8 17 2	7 10 0	7 10 0	5 15 2
1924–25 ..	3 12 2	4 0 0	3 15 0	3 15 0	1 10 0	4 0 0	4 0 0	3 17 2	3 2 0
1925–26 ..	5 3 2	5 3 2	5 8 3	5 3 2	1 5 0	7 5 0	8 5 3	5 10 0	7 5 0
1926–27 ..	5 15 0	6 10 0	6 6 1	6 10 2	3 9 2	8 8 3	6 16 1	5 16 1	5 15 2
1927–28 ..	5 10 0	5 16 1	6 15 0	6 17 2	2 8 3	7 12 1	7 3 3	5 5 0	4 3 3
1928–29 ..	4 3 2	4 12 3	5 0 0	4 3 2	2 1 3	5 5 0	5 2 0	4 8 1	4 1 1
Average for six years ..	5 5 3	5 16 1	6 0 0	5 17 2	2 11 2	6 18 0	6 9 2	5 7 3	5 0 2

1. 3 cwt. super.
2. 6 cwt. super.
3. 9 cwt. super.
4. 6 cwt. super., 1 cwt. pot. sulph.
5. No manure.
6. 6 cwt. super., 1 cwt. ammon. sulph.
7. 6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph.
8. 3 cwt. market garden manure.
9. 3 cwt. basic phosphate.

Table III is probably the most definitely informative and illuminating of all, giving, as it does, the average yield for the six year period, together with average increase for each of the manurial dressings over the unmanured section. The average increase is also expressed

in percentages, to further emphasize the improving effect on the crop, of the various combinations of fertilizers. Here we find that the "6 and 1" dressing heads the list with the somewhat astonishing average increase per acre of no less than 168 per cent. above no manure. Little need be said to emphasize this performance, which is certainly able to speak for itself.

It is noteworthy that the averages for the six years are practically unaltered from those obtained last year when the five year period was under review.

Table III.—Average Returns at Childers (Thorpdale), Gippsland, for Six Years, 1923-24 to 1928-29.

Manure.	Average Yield per Acre.	Average Increase due to Manure per Acre.	Average Percentage Increase per Acre.
	T. C. Q.	T. C. Q.	%
1.—3 cwt. super.	5 5 3	2 14 1	105
2.—6 cwt. super.	5 16 1	3 4 3	125
3.—9 cwt. super.	6 0 0	3 8 2	133
4.—6 cwt. super., 1 cwt. pot. sulph. ..	5 17 2	3 6 0	128
5.—No manure	2 11 2	..	..
6.—6 cwt. super., 1 cwt. ammon. sulph.	6 18 2	4 7 0	168
7.—6 cwt. super., 1 cwt. pot. sulph., 1 cwt. ammon. sulph.	6 9 2	3 18 0	153
8.—3 cwt. market garden manure ..	5 7 3	2 16 1	109
9.—3 cwt. basic phosphate	5 0 2	2 9 0	95

Results at Warragul.

At Warragul, the experimental station has been in existence for three years now. In one respect, this soil, which is a clay loam of good quality, is unique. It is unique because it is the only soil in Victoria in which potash manure gives a profitable increase of crop. The result of the soil analysis is given in Table IV.

Table IV.—Result of Analysis of Warragul Soil.

Nitrogen	193	parts per 100,000
Phosphoric Acid ..	59	„ „
Potash	98	„ „
Lime	84	„ „
Magnesia	121	„ „
Chlorine	4	„ „

The response to potassic manuring is not surprising in this case, because the potash content of the Warragul soil is probably among the lowest of any soils in which potatoes are grown in this State. To give some idea of its deficiency in this mineral, the following table is given. A good soil, on analysis, should show somewhere around the following figures for nitrogen, phosphoric acid and potash.

Table V.—Showing Quantity of Nitrogen, Phosphoric Acid, and Potash Required in the Ideal Potato Soil.

Nitrogen ..	..	150 parts per 100,000
Phosphoric Acid	..	150 „ „
Potash ..	..	250 „ „

Comparing this table with the previous one, it will be seen that the Warragul soil is poor in phosphoric acid and proportionately poorer in potash, hence the necessity for its inclusion in the manurial ration for the potato crop.

A glance at the figures in Table VI. will show that this soil is also very responsive to manurial treatment—in some cases, over one hundred per cent. increase of crop resulting from its application.

The "6 and 1" dressing here again has given very excellent results, being but little under the 6 cwt. super and 1 cwt. potassium sulphate. Curiously, however, the complete manure, No. 7, in which ammonium and potassium sulphate are used in conjunction, shows a distinctly lower yield. No explanation of this can be offered at the present time—the fact is simply recorded.

Table VI.—Results of Manure Trials on Potatoes at Warragul, 1928-29.

Conducted on the farm of Mr. S. Adkins. Soil—clay loam.

Manures.	Market Sized Tubers.	Increase from Manure.	Cost of Manure per Acre.	Cost per Ton Increase.	Increased Value per Acre.	Net Increased Value per Acre.	Percentage Increase.
	T. C. Q.	T. C. Q.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	%
1.—3 cwt. super. ..	6 8 2	2 16 1	0 18 9	0 6 9	33 15 0	32 16 3	77
2.—6 cwt. super. ..	7 12 2	4 0 1	1 17 6	0 9 4	48 3 0	46 5 6	111
3.—9 cwt. super. ..	6 5 3	1 13 2	2 16 3	1 4 5	20 2 0	17 5 9	44
4.—6 cwt. super., 1 cwt. pot. sulph. ..	7 15 1	4 3 0	2 13 0	0 12 4	49 16 0	46 3 0	115
5.—No manure ..	3 12 1	..	..	..	..	..	..
6.—6 cwt. super., 1 cwt. ammon. sulph. ..	7 12 2	4 0 1	2 14 3	0 13 9	48 3 0	45 8 9	111
7.—6 cwt. super., 1 cwt. pot. sulph., 1 cwt. ammon. sulph. ..	6 19 1	3 7 0	3 9 9	1 0 0	40 4 0	36 14 3	93
8.—3 cwt. market garden manure ..	6 16 2	3 4 1	1 8 6	0 8 8	38 11 0	37 2 6	88
9.—3 cwt. basic phosphate	6 8 2	2 16 1	0 19 6	0 6 11	33 15 0	32 15 6	77
10.—4½ cwt. nitro. phoska.	6 5 3	2 13 2	5 3 6	1 18 11	32 2 0	26 18 6	73
11.—3 cwt. market garden manure, with sprouted seed ..	9 7 2	5 15 1	1 8 6	0 3 11	69 3 0	67 14 6	159

The seventh table gives the summary of the three years' figures obtained at Warragul since these trials were instituted there. Quite a wide range of difference in the yields for the three seasons will be noted, due, of course, to seasonal variations in weather conditions, showing again the important bearing which adequate rain, during the period of maturation, has on the crop. The rainfall during the year 1926-27 was, in this district, sufficiently abundant to give double the yield obtained in 1928-29, although in both cases the manures, soil, &c., were the same.

Table VII.—Results of Manure Trials on Potatoes at Warragul for Three Years, 1926-27 to 1928-29, Showing Average Returns for that Period. Soil—clay loam.

——	1.	2.	3.	4.	5.	6.	7.	8.	9.
	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
1926-27 ..	12 15 0	12 15 0	13 0 0	15 0 0	6 18 3	13 7 2	14 0 0	11 2 2	10 12 2
1927-28 ..	7 10 0	9 18 0	10 3 2	10 14 1	3 1 2	10 3 2	10 14 1	7 10 0	7 10 0
1928-29 ..	6 8 2	7 12 2	6 5 3	7 15 1	3 12 1	7 12 2	6 19 1	6 16 2	6 8 2

Manure 1-9 as per Thorpdale Sheet.

As in the case of the Childers figures, those for Warragul have been worked out to show the average performance of each manurial variation for the three year period. These are very significant in their demonstration of their efficiency and profitableness as shown hereunder:—

Table VIII.—Average Returns at Warragul, Gippsland, for Three Years, 1926-27 to 1928-29. Soil—clay loam.

Manure.	Average Yield per Acre.	Average Increase per Acre.	Average Percentage Increase per Acre.
	T. C. Q.	T. C. Q.	%
1.—3 cwt. super.	8 18 0	4 7 1	96
2.—6 cwt. super.	10 1 3	5 11 0	121
3.—9 cwt. super.	9 16 1	5 5 2	116
4.—6 cwt. super., 1 cwt. pot. sulph. ..	11 3 0	6 12 1	145
5.—No manure	4 10 3	..	..
6.—6 cwt. super., 1 cwt. ammon. sulph...	10 7 3	5 17 0	129
7.—6 cwt. super., 1 cwt. pot. sulph., 1 cwt. ammon. sulph.	10 11 0	6 0 1	133
8.—3 cwt. market garden manure ..	8 9 2	3 18 3	86
9.—3 cwt. basic phosphate	8 3 2	3 12 3	80

SULPHURING APRICOTS.

Procedure Recommended by Committee Convened by the Council for Scientific and Industrial Research.

In June last a committee consisting of Messrs. Geo. Quinn, Chief Horticultural Officer, South Australia; C. G. Savage, Director of Fruit Culture, New South Wales; A. V. Lyon, Officer in Charge, Research Station, Merbein; and W. R. Jewell, Research Chemist, Department of Agriculture, Victoria; was convened by the Council for Scientific and Industrial Research to consider the question of sulphuring dried fruits and, in particular, to recommend a treatment which would ensure a satisfactory product without leaving an excess of sulphur dioxide in the fruit.

While the committee considered that existing data were insufficient to establish absolutely conclusive recommendations, it was satisfied that sufficient information was available to formulate a procedure which, in the case of apricots, might reasonably be expected to give a satisfactory product in the majority of cases. The sulphuring of peaches and pears, in the opinion of the committee, did not offer any serious difficulties.

In view of the large quantity of apricots that was oversulphured last year, it is apparent that growers must take more care in sulphuring if the resultant product is to comply with the regulations in force here and in England regarding the amount of sulphur dioxide permitted in dried fruit. In his own interests, therefore, every grower producing dried apricots is strongly recommended to adopt the procedure outlined below, when he should experience little difficulty in keeping the sulphur dioxide content below 14 grains per lb. and, at the same time, produce a marketable product.

Recommended Procedure.

(*a*) *Maturity.*—It is essential that all fruits be picked "eating ripe" and that, when cutting, all firm or over-ripe fruit should be put to one side and either discarded or sulphured separately so that all the fruit in one chamber may be of uniform maturity, and, therefore, yield a uniformly sulphured product. It is recognized that firm fruit absorbs sulphur less readily than ripe.

(*b*) *Type of Chamber.*—It is recommended that an air-tight chamber be used, the covering of which should be of some light material, e.g. "malthoid." In the case of movable hoods, every precaution should be taken to prevent ingress of air at the base of the hood as, for example, by using compacted, moist earth around the bottom.

A number of small air-tight chambers is recommended in preference to one large one so that fruit shall not be held for any length of time after cutting and before sulphuring. For example, when using

6-ft. x 3-ft. trays, the size of the chamber should be sufficient to accommodate a stack of about fifteen trays with a clearance of about 6 inches between the trays and the sides and top of the chamber. Trays should be staggered 6 inches when stacking.

Two controllable vent holes, 1 inch diameter, and about 1 foot apart, should be provided in the roof of the chamber close to the wall furthest from the sulphur fire when one fire is used, or in the centre of the roof where a fire is used at each end of the chamber.

A movable vent-glass is a desirable adjunct in order to view the conditions inside the chamber and to test the condition of samples of the fruit.

(*c*) *Quantity of Sulphur.*—From 7 to 8 lb. of sulphur per ton of fresh cut fruit should prove ample, and it is essential that the sulphur be dry in order to burn readily. The sulphur pit should preferably be located just outside at one, or both, ends of the chamber, with a free entrance into the chamber and adequate provision for closing the air inlet after the vents are blocked. Only a minimum amount of inflammable material should be used to light the sulphur and when fumes are issuing freely from the vents they should be closed with tightly fitting corks.

The weight of fruit in a charge should be ascertained by weighing the quantity of pitted fruit on two or three trays; the average per tray and the total weight per charge can then be obtained. Calculate the amount of sulphur necessary, weigh this and measure the volume in a container. Thereafter it would be sufficiently accurate to measure the same volume of sulphur each time a similar number of trays is sulphured.

(*d*) *State of Fruit.*—It is desirable to sulphur as quickly as possible after cutting, preferably within two hours. (Hence the desirability, under (*b*), of a number of small chambers.)

Fruit should be stacked from the bottom upwards in the order in which it is cut. Freshly cut fruit absorbs sulphur dioxide more readily than that cut some time prior to sulphuring, and this arrangement of stacking allows the driest fruit to be in contact with the maximum density of warm sulphur fumes, thus tending to uniform sulphuring results.

(*e*) *Period of Exposure.*—Under average summer day temperatures four to six hours' exposure to the sulphur fumes is considered sufficient to preserve the colour without oversulphuring. The practice of leaving the fruit in the sulphur chamber overnight is not advocated as it frequently results in oversulphuring. If it is found essential to sulphur overnight the vent holes should be opened at the end of three hours.

(*f*) *Characteristics of Sulphured Fruit.*—The filling of the cups with juice is not necessarily a reliable indication of satisfactory sulphuring, as fruit in this condition may frequently be oversulphured.

Correctly sulphured fruit is usually characterized by a firm core, an easily detachable skin with some exudation of juice into the cup and a general evenness of colour of the cut surface. If the whole of the flesh becomes soft and the cups overflow with juice, it can usually be assumed that the fruit is oversulphured.

SHEEP TICK AND SHEEP LICE.

By the Veterinary Staff, Department of Agriculture.

I.—SHEEP "TICK" (*Melophagus ovinus*).

(Other names given to this parasite are Sheep Louse Fly and Ked.)

Description.

This parasite is not a true tick, but a wingless fly which passes the various stages of its life history on the sheep. It is reddish or grey-brown in colour; its average length is ¼ inch. It has six legs, a distinct head, thorax and abdomen, which latter becomes distended when engorged with blood. At the head is a sucking tube with which the skin of the sheep is punctured and blood and lymph drawn up.

It can be distinguished from a true tick by its shape and number of legs—the true tick having eight legs, an inconspicuous head, whilst the thorax and abdomen are fused.

Life History.

The female extrudes the larva, which is covered with a soft membrane and is deposited by the female on the wool, to which it adheres. In about twelve hours, the covering membrane turns brown and hardens, and the larva then becomes the pupa: it is this stage—the pupa in its case—which is popularly known as the egg of the "tick." These so-called eggs are generally about half-an-inch from the skin, and remain on the fleece when shorn.

In from 19 to 24 days, depending on climatic conditions, the young parasite emerges from the hard brown case, and becomes sexually mature in five days. In from eight to ten days after fertilization, the first larva may be deposited by the female, but the usual period is longer and may be up to eighteen days.

The life of the female extends over a period of from four to five months, and during this time, she extrudes a larva about every nine days.

Habits.

The adult sheep ticks feed by burying their sucking tubes in the skin tissue and drawing up blood and lymph. When not feeding, they move about in the fleece. If any become dislodged and fall to the ground, they take the first opportunity of crawling on to another sheep.

When sheep are heavily infested, the "ticks" can be found on all parts of the body. Freshly shorn sheep offer little protection for the "ticks" with the result that they move on to the lambs or any unshorn sheep. They may also find a temporary home on dogs, or on the clothing of the men coming in contact with the infested sheep.

Experiments have shown that if separated from sheep, "ticks" do not live for long—eighteen days being the maximum period. But a greater factor influencing the length of time premises and pastures may remain infested after the removal of sheep is the fact that pupae—the so called eggs—may be attached to pieces of wool which have been

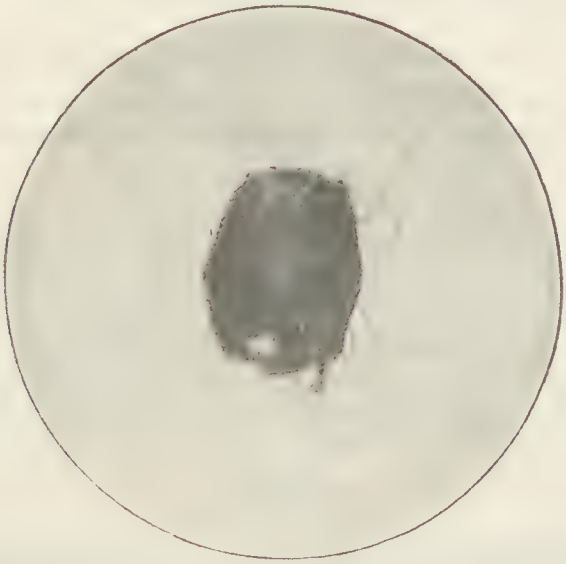


Fig. 1.—Pupa of Sheep Tick, commonly called the egg, taken from fleece of sheep; enlarged.

Fig. 2.—Young Sheep Tick emerging from puparium; enlarged.

pulled out either by the sheep themselves or by wire and shrubs, and thus will be enabled to remain in the pastures or pens. Further, the length of time these detached pupae take to hatch is extended, and may be as great as 42 days, as against a maximum of 24 days when on the sheep.

Symptoms of Sheep Tick Infestation.

Being a blood sucker, this parasite causes loss of blood and irritation. The irritation interferes with the sheep in feeding, and this results in loss in vitality. The wool becomes soiled by the excreta and by the pupae or so-called eggs. Thus we get the wool affected, firstly by the injury to the sheep itself resulting in a poorly-nurtured fleece, and secondly by the mechanical soiling.

Fig. 3.—Mature Male Sheep Tick, back view; enlarged.

[Figs. 1, 2, and 3 are reproduced from Farmers' Bulletin No. 793 of the United States Department of Agriculture.]

II.—THE SHEEP LOUSE (*Trichodectes ovis* or *T. sphaerocephalus*).

Description.

The male louse is about one-twentieth of an inch long; the female is slightly larger. The head is larger than the thorax and is as wide as it is long. The abdomen is bi-convex in outline and is segmented, each segment showing a dark line along it and having one row of hairs. There are six legs and two feelers.

Lice are not easily seen, as they live on the skin at the base of the wool fibres, and careful searching is necessary, preferably in direct sunlight and with the aid of a pocket lens.

The side of the neck and along the shoulders are favorable places on which to locate them.

Life History.

The eggs (nits) are attached to the wool and hatch out in from five to ten days. The young lice become mature, fertilization of the female takes place, and eggs are laid in about fourteen days from the time of hatching.

Lice never leave their host except to transfer themselves to other sheep by direct contact.

Owing to the rapidity with which lice breed, infestation of a flock takes place quickly, and a single louse-infested sheep introduced will cause the flock to become infested in a very short time.

Symptoms.

When feeding, the louse bites into the skin with its mandibles, causing intense irritation and itching. This interferes with nutrition, and affected animals will not fatten or keep in condition as they should, and any young animals become stunted in growth.

Fig. 4.—Sheep Louse (*Trichodectes ovis*) Adult Female; enlarged.

[Reproduced from Farmers' Bulletin No. 1150 of the United States Department of Agriculture.

The itching leads to scratching with a resultant ragged fleece, and time is occupied in scratching, biting, and rubbing, that should be spent in feeding.

Actual sores may be formed where the lice cluster, and further, the excreta and eggs soil the wool to a considerable extent.

TREATMENT AND CONTROL FOR TICK AND LICE INFESTATION.

Dipping is the recognized method of treatment, and the operation consists of immersing the sheep in a medicated liquid that will kill the parasites.

The sheep must be held in the dipping medium sufficiently long for the fleece to become saturated, and there should be sufficient fleece on the sheep to retain the dip, so that its effect will last for a period of time after the operation.

The entire flock of sheep and lambs should be dipped, but the lambs should be put through separately. The head of each animal should be submerged twice, but must not be held under.

In each district, dipping should be carried out more or less simultaneously by the various sheep owners, thus lessening the chances of re-infestation.

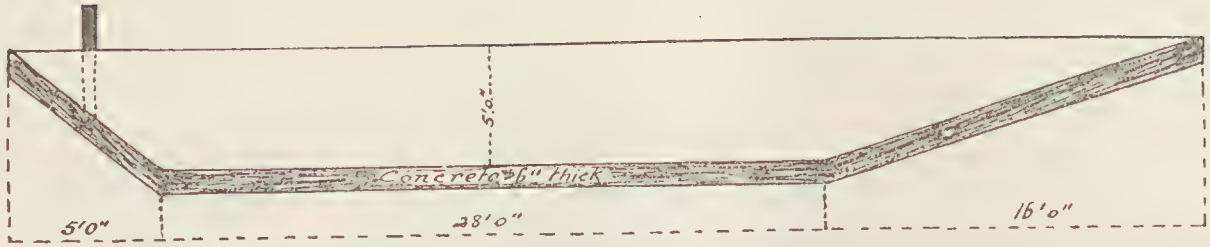


Fig. 5.—Section of Concrete Dipping Bath.

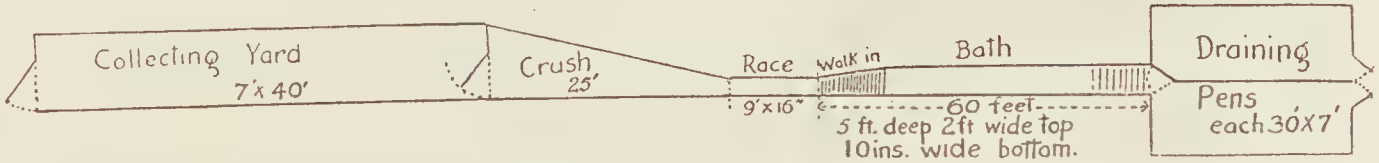
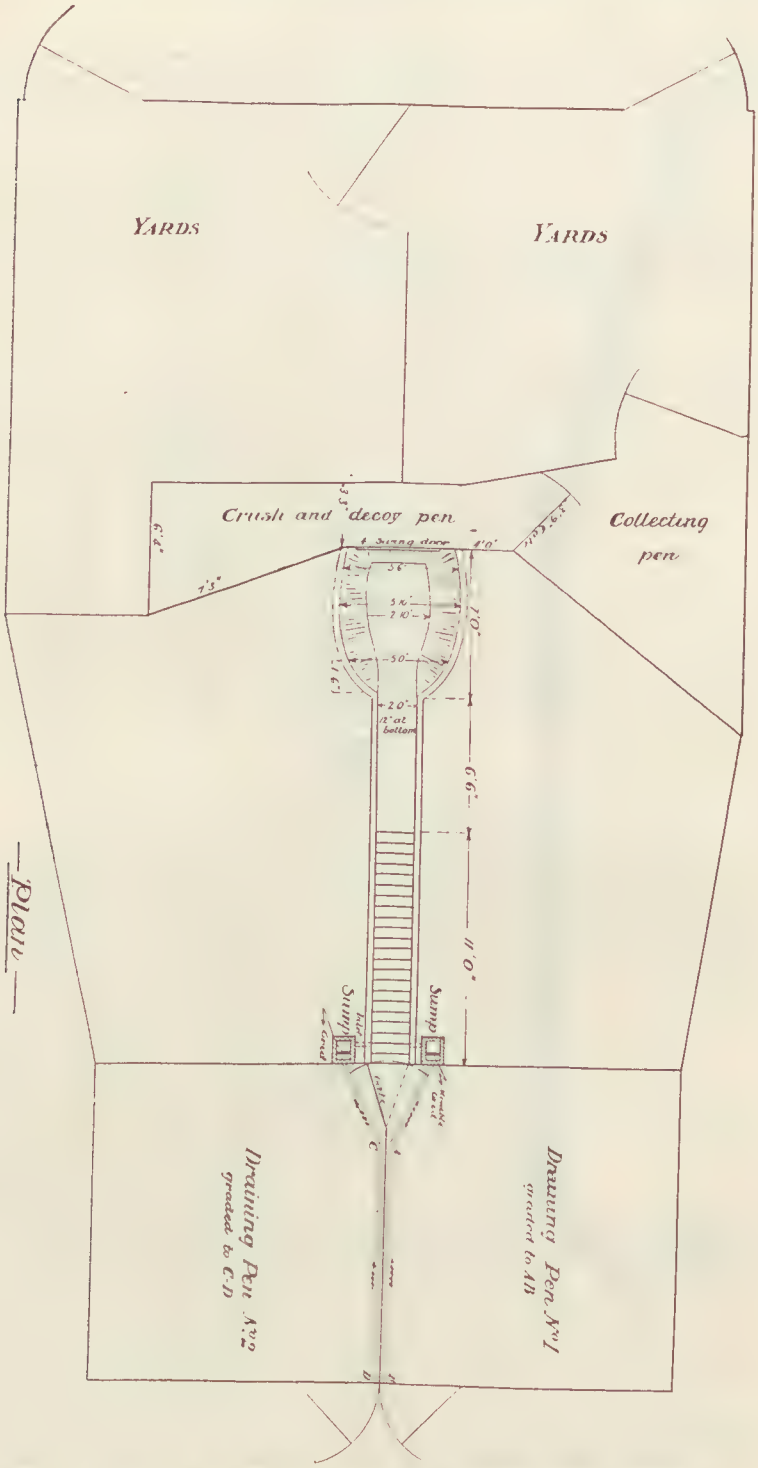
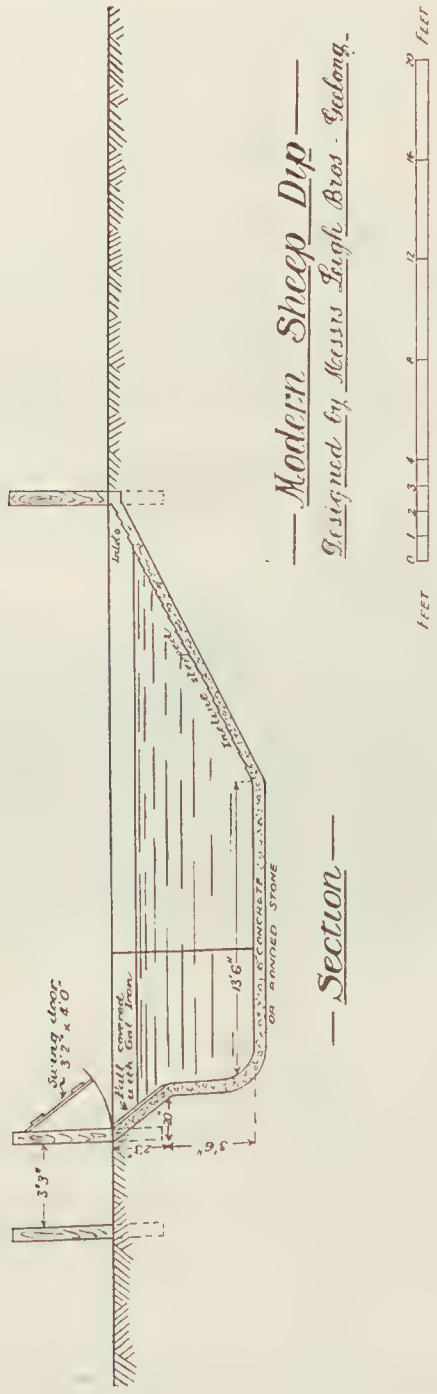


Fig. 6.—Straight Swim Walk-in Entrance Dipping Bath.

[Figs. 5 and 6 reproduced from *Sheep, Farm, and Station Management*, by E. H. Pearse.]



Plan of Sheep Dip at Messrs. Leigh Bros., Roselea, near Geelong.


—Modern Sheep Dip—
Designed by Messrs Light Bros. Gulong.
FEET
0 1 2 3 4 8 12 20 FEET
—Section—
Swing door 3'2" x 4'0"
Hill covered with Cast Iron
Inside Slope 1 in 3
13'6"
Concrete 6" thick on Rounded Stone
3'3"
9'5"

The sheep should not be dipped immediately after shearing, but time must be allowed for cuts to heal and for a certain growth of fleece so that the dip will be retained.

Sheep stand dipping best when they have not much food in their stomachs. Allow feed and water some three to six hours prior to the dipping. It is advisable that the process be finished by noon, and it is more advantageous if carried out on the property; but if sheep have to be driven any distance to a dip, they should always be allowed sufficient time to cool off before being immersed.

To be of value, a dipping fluid must not only have an effect on the living adult parasites, but must be capable of being retained by the fleece for a considerable time afterwards in sufficient strength to destroy newly-hatched parasites, so as to prevent re-infestation.

If dipping be correctly carried out, it is a valuable investment for the sheep owner. Parasites are destroyed, and the skin remains healthy, and the sheep are kept in such health and condition as will enable them to produce a high-grade wool.

For successful treatment of infested sheep with a view to eradication rather than simply to control these parasites, more than one dipping is necessary, and the time interval between the dippings is most important. For lice infestation, this interval is from 14 to 16 days; for "tick," it is 24 to 28 days.

All droppings, shreds of wool, &c., should be cleaned out of pens and sheds which should then be sprayed with sheep dip of double strength.

Wherever possible, paddocks should be used for purposes other than sheep grazing for at least 60 days.

The following brief hints from a chapter in Mr. E. H. Pearse's book, *Sheep, Farm, and Station Management,* summarize dipping instructions.

1. Mix the dip in drums at least 24 hours before using.
2. Keep the dip constantly stirred.
3. Skim off scum as soon as it appears.
4. Never hurry sheep through a dip.
5. Have a man to assist the sheep at the exit of dip.
6. Give them plenty of time to drain in draining pens.
7. After draining, put them under cover in a shed or in a shady paddock.
8. Never drive sheep while wet with dip.
9. When the wash becomes foul, empty and replenish with fresh dip.
10. Make sure every sheep is dipped.
11. Get neighbours to dip at same time.
12. Implicitly follow directions for use of any particular brand of sheep dip used.

The Sheep Dipping Act provides that every sheep-owner shall shear all his sheep annually, and shall dip all his sheep and lambs immediately after shearing, or keep them in a securely-fenced paddock and dip them within 60 days after they have been shorn. A return of sheep dipped must be furnished to the Chief Veterinary Inspector in the prescribed form (obtainable from the Department of Agriculture) within one month after dipping. Sheep or lambs infested with tick or lice must not be travelled, or placed in any sale-yards or public place.

PIG FEEDING TESTS.

By A. J. Gill, Senior Herd Tester.

Avoid the Mongrel.

The two essential requirements for profitable pig farming are:—The breeding of the correct type, and economical feeding.

It is unfortunate that the majority of pigs on our farms are mongrels —the progeny of mongrel sows by boars of the same class. It is very doubtful if it ever pays to rear animals of this type. They are always of poor shape, and will never make bacon of good quality; in fact, they are a source of worry to the bacon-curer.

Visiting a factory recently I was shown a draft of pigs numbering over a hundred from one of our dairying districts, and they were cer-

Bacon Pigs at Self-feeder.
(At Mr. R. Purnell's, Moriac.)

tainly disappointing. One would have found it a very hard task to have picked three good baconers from the lot. Many of them were altogether mis-shapen; some were almost hairless; there were pigs with hollow backs and sloping rumps, there were some with crests and manes; there were pigs of every shape but the correct one.

The manager admitted that they were inferior animals, and would give a very poor class of bacon, but he said that he had either to buy such pigs or go without.

The farmer should remember that the mongrel pig is like all other mongrel stock—unprofitable. Like the scrub bull, the scrub boar should be exterminated.

If our farmers would pay a little more attention to the breeding of pigs of the correct type, there would almost certainly be an increased local demand for pork and bacon. The well bred pigs give a much better shaped side and bacon of finer quality than do mongrel animals, and

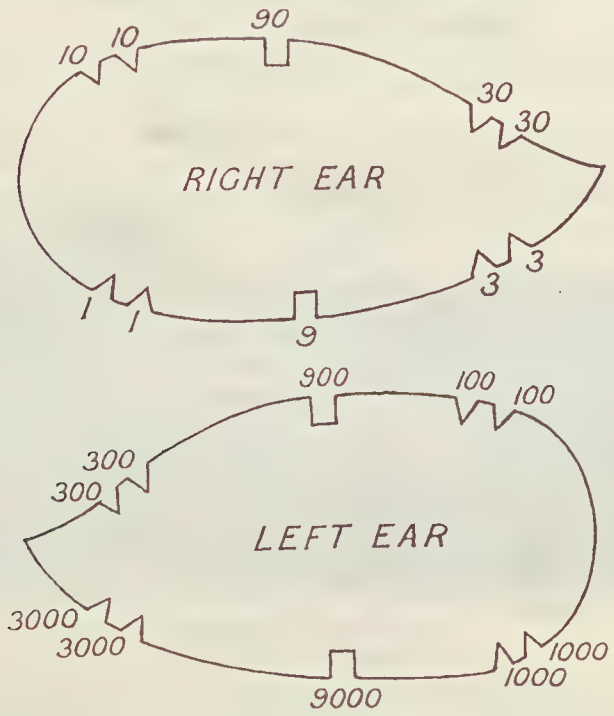
the breeding of good animals will pay well for the cost of feeding. Indeed there is no other farm animal which has the earning capacity of the well-bred sow.

Some Feeding Experiments.

But besides being correctly bred, the pig must be correctly fed.

The old style of keeping pigs in sties was more expensive than the open-air method which is now being adopted. This latter system, besides being more sanitary, means a great saving in labour.

Pigs running on pasture will require less of other foods. The balancing of the food which is used in conjunction with the pasture is a very important factor. In order to ascertain what food or what combination



of foods will give the best results a series of experiments is being carried out at the farm of Mr. R. Purnell, at Moriac. Mr. Purnell has lately toured the United States of America, England, Denmark, and other European countries in order to study scientific methods of farming, and has kindly offered to assist the Department in every way that he can. The experiments will extend over several months, and will be carried on as developments warrant.

The rearing of pigs on Mr. Purnell's farm is carried out methodically and on business lines. Each sow is numbered in such a way that she can be identified at a glance. This numbering is effected by a system of ear-marks which is capable of recording numbers ranging from one to thousands. The method is indicated in the diagram above.

This ingenious system is followed at one of the largest pig farms in England.

A full record is kept by a card system of each sow's record—her pedigree, her date of birth, date of farrowing, number of litter, &c. (When a sow produces only a small litter, or she proves herself a bad mother, she is culled). A complete history of every pig born on the farm is also kept on cards. The records of pigs born in the various months of the year are noted on cards of differing colours—for instance, the details of those farrowed during January are recorded on grey cards; of those farrowed in February, on yellow cards; of those farrowed in

Water Supply to Pig Run.
(At Mr. R. Purnell's, Moriac.)

Brood Sows Grazing on Green Barley.
(At Mr. R. Purnell's, Moriac.)

March, on blue cards, and so on. Each compartment in a drawer represents a paddock, and thus the number of pigs of different ages in each paddock can very easily be ascertained. Further, the condition of the pigs can be readily seen; for instance, if there were yellow cards among the blue it would be an indication that one or more litters were not thriving as they should, and probably the dams of these litters would be removed to a fattening paddock.

The pigs chosen for the feeding test were sixteen large Yorks and two of another breed. When they were nine weeks old and in nice condition

they were divided into two lots of nine each. Both lots were placed in paddocks of 1 acre each, in which there was fair pasture. Unfortunately the pigs in No. 2 were hostile to one of their number and attacked it so viciously that it had to be removed. It was placed with the No. 1 lot, which increased the total of that lot to ten.

No. 1 lot was given mixed foods. Almost equal quantities of gristed barley and pollard were allowed, with sufficient linseed meal and meat meal to bring the nutritive ratio to about 1 to 4. (When worked out it was actually 1 to 3.96.)

No. 2 lot received gristed barley and pollard mixed in an automatic feeder, while linseed meal and meat meal were supplied in two separate hoppers, thus allowing the pigs to balance their own ration. The food consumed by this lot showed a nutritive ratio of 1 to 5.9. The ratio of the young green grass may be assumed to have been about 1 to 3.

During the first month the pigs on the mixed food showed a distinct gain over the free choice lot, but in the second month the free choice lot gained in weight and outstripped the others. They ate very little linseed or meat meal after the first month. At the end of the experiment it was found that it had cost 10s. 3d. per head less to feed the free choice lot than it did to feed the others during the same period. They were also of a much better appearance. The results from the sale of all the animals in the test was approximately £100, which meant a fair profit.

It is proposed to carry out further experiments on somewhat similar lines, though there seems to be little doubt that the free choice method of feeding is more profitable than the other system tried.

No. 1 Lot—Mixed Food Test.

Details of Weight during Test, Food Consumed, etc.

Numbers.	Date of Weighing.				
	20th March.	9th April.	10th May.	10th June.	24th June.
	lb.	lb.	lb.	lb.	lb.
445	38	64	112	166	189
446	44	73	131	179	202
447	45	70	119	166	190
448	43	70	125	170	199
449	40	64	110	157	198
450	41	63	108	156	178
451	43	65	114	150	170
452	42	68	118	161	184
455	43	48	100	151	173
454	45	69	122	170	198
Total weight	424	654	1,159	1,626	1,861
Average weight	42·4	65·4	115·9	162·6	186·1
Period between weighing ..	..	20 days	31 days	31 days	14 days
Average gain between weighing date	..	23 lb.	50·5 lb.	46·7 lb.	23·5 lb.
Average gain daily ..	..	1·15 lb.	1·63 lb.	1·51 lb.	1·68 lb.

FOOD CONSUMED.

—	—	Price.	Value.
			£ s. d.
Gristed barley	2,400 lb.	3s. 5d. per bushel ..	8 4 0
Pollard	2,350 ,,	£7 per ton	8 4 6
Linseed meal	490 ,,	£16 per ton	3 18 6
Meat meal	460 ,,	£12 10s. per ton ..	2 17 6
Total	5,700 lb.	Total value ..	23 4 6

Food consumed per pig, 570 lb.—Cost of fattening per pig, £2 6s. 5½d.

Amount of food eaten per pig daily, 5·93 lb.—Average gain per pig daily, 1·49 lb.

Food required for 1 lb. of pork, live weight, 3·96 lb.

Cost of 1 lb. of pork, live weight, 3·89d.

Total food constituents (pasture not included):—874·99 lb. of protein; 2,967·55 lb. of Carbohydrates; 199·15 lb. of fat; Nutritive ratio 1 to 3·96.

No. 2 Lot—Free Choice Test.

DETAILS OF WEIGHT DURING TEST, FOOD CONSUMED, ETC.

Numbers.	Date of Weighing.				
	20th March.	9th April.	10th May.	10th June.	24th June.
	lb.	lb.	lb.	lb.	lb.
438	45	65	111	173	191
439	45	68	119	168	187
440	38	56	99	144	168
441	42	70	119	166	185
442	32	47	91	142	164
443	40	60	106	158	176
444	44	67	109	158	178
453	45	72	125	180	206
Total weight	331	505	879	1,289	1,455
Average weight	41·38	63·13	109·87	161·13	181·87
Period between weighing ..	..	20 days	31 days	31 days	14 days
Average gain between weighing dates ..	..	21·75 lb.	46·74 lb.	51·24 lb.	20.74 lb.
Average gain daily ..	..	1·09 lb.	1·51 lb.	1·65 lb.	1.48 lb.

AMOUNT OF FOOD CONSUMED.

—	—	Price.	Value.
			£ s. d.
Gristed barley	2,064 lb.	3s. 5d. per bushel ..	7 1 0
Pollard	2,070 ,,	£7 per ton	7 5 0
Meat meal	15 ,,	£12 10s. per ton ..	0 1 11
Linseed meal	10 ,,	£16 per ton	0 1 9
Total	4,159 lb.	Total value ..	14 9 6

Amount of food eaten per pig, 519¾ lb. in 96 days.

Cost of fattening per pig, £1 16s. 2d.

Food eaten per pig daily, 5·4 lb.—Average gain per day, 1·46 lb.

Food required for 1 lb. gain, 3·7 lb.—Cost per 1 lb. of pork, live weight, 3.08d.

Total food constituents (pasture not included):—460·794 lb. of protein; 2,419·87 lb. of Carbohydrates; 123.554 lb. of fat; Nutritive ratio, 1 to 5·92.

MAIZE TESTS AT ORBOST AND LINDENOW.

By P. Ryan, B.Ag.Sc., Inspector of Agriculture.

ORBOST.

The maize variety and manurial tests which the Department of Agriculture, in co-operation with the Orbost Maize Growers' Association, initiated last year were continued during the season just closed, but the location of the plots was changed to Mr. G. H. D. Russell's farm at Bete Bolong.

The soil here is a rich silt, typical of a large part of the fertile Snowy River flats on which maize has been grown continuously for nearly 50 years, and on which very high yields are still obtained.

The interest in the variety test was well maintained, and the entries showed an increase of four over those submitted last year. The 24 strains sown in the plot included practically all the representative varieties grown in the district.

The seed was sown on 24th October in check rows 3 feet apart. Every third plot was a check plot sown with Mr. G. H. D. Russell's Canadian Pride maize. No fertilizer was applied to any of the variety plots.

The rainfall from the time of planting till harvest is recorded below, as well as the average rainfall for the same period for the past 30 years:—

—	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total.
Rainfall, 1928–29 ..	304	139	160	30	214	131	219	480	172	1,849
Average 30 years ..	279	210	243	288	237	235	260	264	308	2,324

It will be seen that the rainfall during the growing period of the crop was nearly 5 inches below the average, and the shortage was particularly marked in November, December, and January. The maize in the plots was checked by this dry spell, and did not recover well when the rain came. The result has been that the yields were not nearly so high as those obtained in the plots last year.

Variety Tests.

Results from Plots Each Four Rows Wide and 3 Chains Long, 3-55ths Acre in Area.

Grower.	Yield in Bushels per Acre.	Yield of Check Plot. Bushels per Acre.	Increase or Decrease over Check Plot. Bushels.
			Bushels.
G. H. D. Russell (Reid's Improved Dent) ..	77·4	66·5	+10·9
W. Cummings	73·7	65·7	+ 8·0
J. Murphy (Lindenow)	82·3	75·7	+ 6·6
— Warren	82·5	76·2	+ 6·3
Ah Chow Bros.	81·6	78·6	+ 3·0
W. Gribenow	78·5	75·5	+ 3·0
G. H. D. Russell (Canadian Pride)	66·4	64·2	+ 2·0
J. Lynn	77·4	76·6	+ ·8
F. Mundy	62·1	62·8	— ·7
H. Rodwell	71·3	72·5	— 1·2
W. Cummings	71·8	73·3	— 1·5
Aitken Bros.	67·2	69·9	— 2·7
G. Burn (Kalimna)	66·2	70·5	— 4·3
J. Johnston	71·2	76·9	— 5·7
J. W. Lynn	60·3	66·2	— 5·9
K. Lynn	66·2	73·2	— 7·0
Telfer Bros. (Lindenow)	53·8	60·9	— 7·1
J. Perry	67·3	75·3	— 8·0
W. Trewin	64·3	72·7	— 8·4
J. Reynolds	62·2	70·7	— 8·5
A. Cameron	60·1	73·9	—13·8
H. Rodwell (Golden Glow)	51·6	68·4	—16·8

All yields reduced to 14 per cent. moisture content.

The maize which gave the highest comparative yield was Reid's Improved Yellow Dent entered by Mr. G. H. D. Russell. The seed had been obtained from the Illinois University by Mr. Russell's father while he was on a visit to the United States a few years ago. This variety was developed by the agricultural staff of the University by selection from the well-known variety Reid's Yellow Dent, and has become popular in Illinois. In the plots this maize has shown a commendable uniformity and trueness to type, and has given a high shelling percentage. In last year's test its yield was disappointing, but possibly this was due to lack of acclimatization.

The second highest yield was given by Mr. W. Cummings' entry. This maize was obtained some years ago from Telfer Brothers, Lindenow, and Mr. Cummings has since been selecting it on his own lines. It now shows deep-set grains with a rather sharp beak.

The third place was occupied by a strain entered by Mr. J. Murphy, Lindenow. It has always yielded well in the variety trials at Lindenow for the last five years, and also did well in the tests at Orbost last year. It is a comparatively early maize, and bears smaller cobs than the varieties generally grown at Orbost.

The two strains which gave the highest yields last year—Messrs. Ah Chow's strain and Mr. G. H. D. Russell's Canadian Pride—again yielded well, but did not reach the leading places in the competition.

The tests have not been conducted long enough to justify definite conclusions being drawn as to the relative superiority of the different strains grown in the district, and growers are advised not to accept any one year's results as a reliable guide. The maize which is likely to give the most profitable results is the one which gives abundant yields over a series of years, and this can be determined only after several years' testing.

It would appear from the results so far available that, under the favorable soil and climatic conditions obtaining at Orbost, very early varieties do not give as high yields as those that take longer to mature. However, for the information of those who, on account of the danger of floods or other special circumstances, find it necessary to grow a quick-maturing variety, it may be said that the earliest strains in the plots appeared to be those of Messrs. H. Rodwell (Golden Glow), F. Mundy (Golden Glow), H. Rodwell (Funk's Ninety Day), and W. Cummings (Funk's Ninety Day).

Manurial Tests.

The manurial plots were repeated on the same plan as last year. The system adopted is what is known as the replicated "paired plot" method. Each plot treated with manure is compared with an unmanured check plot sown alongside it. The replication is obtained by repeating the pairs of plots six times. This system is designed to give greater accuracy by eliminating as far as possible soil variations and chance results, and it is possible to calculate the reliability of the results obtained.

The manurial plots were sown on 25th October, and on the superphosphate plots the manure was applied at seeding time, but the sulphate of ammonia was applied as a top-dressing on 13th December.

Table Showing Manure Used and Results Obtained

(Plots each 4 rows wide and 3 chains long—Area 3-55ths acre).

Plot.	Yield Average of Six Plots.	Check Plot Yield. Average of Six Plots.	Increase or Decrease compared with no Manure.
	Bushels.	Bushels.	Bushels.
Super. 1 cwt. per acre	69	68	+ 1
Super. 2 cwt. per acre	68	69	- 1
Sulphate of Ammonia 1 cwt.	79·5	77	+ 2·5
Super. 3 cwt. and Sulph. Ammon. 1 cwt. ..	85	81	+ 4

The results are in agreement with those obtained last year in that neither light nor heavy dressings of superphosphate alone had any appreciable effect on the yield. Sulphate of ammonia alone, and also in combination with the superphosphate, gave a slight increase, but the increased yield was not nearly sufficient to pay for the cost of the manure. There are indications that possibly light dressings of the combined manures, such as 1 cwt. of superphosphate and ½ cwt. of sulphate of ammonia, may be found profitable, and it is intended to include in the tests this year a series of plots to test this point.

LINDENOW.

Tests similar to those carried out at Orbost were conducted at Lindenow, at the farm of Mr. T. W. Murphy. They included manurial experiments and a variety trial in which the different strains of maize grown in the district were sown in plots side by side, and the yields compared.

The Bairnsdale Agricultural Society has taken advantage of the variety test to promote a competition, the object being to induce farmers to pay greater attention to the selection of their seed. Points are awarded for actual yield, uniformity, character of the plant and ear, and freedom from disease.

The rainfall at Lindenow during the growing period of the crop was nearly 50 per cent. below the average. In spite of this, satisfactory yields were obtained in the plots, but the incidence of the rainfall suited the late manuring strains best, with the result that for the first time in the five years that the competition has been conducted these strains gave higher yields than did the earlier maturing ones. In pleasing contrast to last season, when a fungus disease, "Cob-rot," seriously reduced yields in the district, the crops this year were generally free from disease.

The variety plots were sown on 27th October in check rows 3 feet apart. Every third plot was a check plot sown with Mr. T. W. Murphy's maize. No manure was applied to the plots in the variety trial. The results were as follow:—

Grower.	Uniformity of Plot.	Character of Plant.	Character of Ear.	Yield.	Freedom from Disease.	Total.
C. Fountain ..	4	7	5	75	2	93
J. Evans	4	8	5	72	2	91
Ross Bros.	4	7	5	72	2	90
T. W. Murphy ..	4	7	5	71	2	89
T. M. Burne (Kalimna)	5	8	5	68	2	88
J. Murphy	4	8	6	67	2	87
Telfer Bros. ..	4	8	6	65	2	85
F. M. Murphy ..	4	7	5	64	2	82

The yield of the winnning strain was 59 bushels per acre.

The six varieties which gave the highest yields are all fairly late in maturing, while the two comparatively early strains—those entered by Messrs. J. Murphy and Telfer Bros.—gave comparatively low yields. However, for the four previous years of the test these two strains proved

their superiority by consistently giving the highest yields, and their comparatively poor performance this year can be discounted on account of the abnormal climatic conditions.

In determining their choice of the strain or variety that will give them the most satisfactory results, growers should be guided by consistently high capacity proved over a number of years and not by isolated results for one year only.

Manurial Tests.

The manurial plots were sown on what is known as the replicated "paired plot" method. Each plot treated with manure is compared with an unmanured check plot sown alongside it. The replication is obtained by repeating the pairs of plots six times. This system is designed to give greater accuracy by eliminating as far as possible soil variations and chance results, and it is possible to calculate the reliability of the results obtained.

The manurial plots were sown on 25th October, and on the superphosphate plots the fertilizer was applied at seeding time, but the sulphate of ammonia was applied as a top-dressing on 11th December.

Results.—Plots Each 4 Rows Wide and 3 Chains Long—Area 3/55ths Acre.

Plot.	Yield—Average of Six Plots.	Check Plot Yield—Average of Six Plots.	Increase or Decrease Compared with No Manure.
	Bushels per acre.	Bushels per acre.	Bushels.
Super., 1 cwt. per acre	60	56	+ 4
Super., 2 cwt. per acre	56	61	— 5
Sulphate of ammonia, ½ cwt.	54	56	— 2
Super., 3 cwt. and sulph. ammon., ½ cwt. ..	52	55	— 3

The application of 1 cwt. of superphosphate gave a slight increase in yield, but in general the results obtained from the use of this and other fertilizers on the maize crops at Lindenow have been disappointing.

Judging by the results from these plots over a number of years, it now appears fairly definite that on the flats at Lindenow on which maize has been grown continuously for so many years the application of artificial fertilizers alone will not be effective in increasing the yields. These flats are naturally very fertile; indeed, no more cogent evidence of their fertility could be advanced than that after nearly 50 years of continuous maize cropping comparatively high yields are still obtained. It must be realized, however, that such a system of agriculture makes a very heavy drain on the fertility of the soil, and in particular leads to humus depletion. As a result the water-holding capacity of the soil is reduced, and the farmer finds it increasingly difficult to produce and maintain a good tilth. In some districts periodical floods depositing rich silt on the flats have made good the loss of fertility, but most of the Lindenow flats have not been flooded for 30 years, and many of them are showing signs of humus exhaustion. The most practicable

method of arresting this exhaustion is to abandon continuous maize-growing in favour of a rotation system which provides for the feeding off of fodder crops. Already some of the most progressive farmers in the district have decided that continuous cropping with maize is not profitable, and have diversified their agriculture by providing for the keeping of more live stock on their farms. Lucerne and cow grass are both worthy of consideration as rotation crops. Both do well on these flats, and individual farmers who have grown them have been surprised at the invigorating effect on the succeeding maize crop. Both crops are legumes, and, therefore, are able to use the nitrogen of the air and store it in the soil in the form of nitrates. Lucerne, of course, will occupy the ground for several years, but cow grass is suitable for a shorter rotation.

Another practice that should be worthy of consideration is the sowing down of a mixed pasture of grasses and clovers, either for dairying or for the topping off of sheep and lambs.

TOMATO CULTURE.

By S. A. Cock, Horticultural Division.

The tomato is, probably, the most commonly grown plant under intense cultivation. Close attention to all phases of culture is necessary if the plants are to thrive and the crop be a success.

It is my intention in this short article to deal more specifically with the raising of plants, cultivation, manuring, and pruning.

The tomato is a native of tropical South America. It is now grown commercially in most parts of the world. The number of cultivated varieties is very numerous. Those recommended for planting in Victoria are—Large Red, Earliana, Burwood Wonder, Chalk's Early Jewel, Wilding's Early Prolific, Orange Prolific and Lesterfield. The requisites for a good market tomato are—early ripening, smooth skin, solid flesh, a good bright red colour, from medium to large size, productiveness, freedom from surface cracks. For market purposes it is desirable to plant three or four of the best varieties rather than to depend on one. Seasons may affect some varieties and not others. Another important thing to remember is that where several varieties are grown, a longer season is obtained, and thus the work of picking is distributed over a greater number of days.

Seed.

Growers should always select and save their own seed. It should be selected from the healthiest and most prolific plants, and by most prolific is meant those plants which bear the greatest quantity of marketable fruit. The fruit from which seeds are to be saved should be allowed to ripen fully on the vine. When large quantities are to be saved from a number of plants, the ripe fruit should be gathered at intervals and dumped into wooden barrels, where it should be pounded into a pulp. No water should be added. There will be sufficient juice in the pulp fruit to ensure speedy fermentation. After standing until the gelatinous

mass surrounding the seed is well decomposed, water should be added. Vigorous stirring facilitates separation of the seed from the pulp. The good seed sinks to the bottom; the light seed, skins, and pulp rise to the surface and may be easily removed. Several successive washings will clean the seed thoroughly, after which it may be removed, spread in thin layers on wire or cloth screens, and placed in the sun or elsewhere to dry as speedily as possible.

Raising Plants.

Plants are usually raised in what is known as the hot-bed cold frame method. A hot-bed frame 6 feet by 24 feet will accommodate 30,000 seedlings. It should be located in a warm, sunny, well-drained spot. In preparing the hot-bed, sufficient fresh warm horse manure to cover it to a depth of one foot is placed in the bed and tramped down. On this is spread a layer of soil 4 inches deep. It should be composed of a mixture of one half sand and one half garden soil free from weeds and decaying vegetable matters.

The seeds are broadcast on this, or they may be sown or drilled in rows 4 inches apart. If sown in rows, about fifteen seeds per inch should be the rate of sowing, and they should be covered to a depth of about one third of an inch. The hot-bed should be kept warm and moist until the seeds germinate. After that, the frame may be ventilated and the young plants sparingly watered. A temperature of about 65 to 75 deg. Fahr. should be maintained.

As soon as the seedlings show their first rough leaves, they are ready to transplant to the cold frame. This is tedious work, and requires to be performed carefully. A cold frame is prepared in much the same manner as the hot frame, except that no fresh manure is used. The top 4 inches of soil in the cold frame should consist of one part sand, one part clean garden soil, and one part very well rotted stable manure, all mixed together and screened through a sieve of fine mesh. The temperature must be regulated according to weather conditions, and for this purpose the frames are covered either with glass, calico or hessian.

The young plants should be planted in lines 3 inches apart each way in the cold frames. After transplanting, they should be watered lightly, and shaded for two or three days by rolling the calico or hessian coverings over the glass. When the transplants have struck root, the coverings should be kept off the glass in the day time.

Watering and ventilation are two very important factors. Over-watering and imperfect ventilation may induce "damping off" and other diseases of the plants. There should be no check in growth in the cold frame. For a week or ten days previous to transplanting to the field, the cold frames should be left open by day and covered only with hessian by night, and only sufficient water given to prevent the plants from wilting. This treatment toughens and hardens them, so that they will stand transplanting without damage or severe shock.

When transplanting to the field is being carried out, the young plants should be placed a little deeper in the ground than the depth at which they stood in the cold frame. This encourages deeper rooting, which is important, as it enables the plant to draw moisture from a greater depth in the soil than when roots are shallow and near the surface.

Seed is sown in May in Northern Victoria, and the young plants removed to the field in July and August. At Bendigo, seed is sown in June and July, and plants transferred to the field in September and October. In the midlands and the south, seed is sown in late July and August, and transplanting to the field takes place in late September, October and November.

Soils and Cultivation.

The tomato does best in a fairly rich, loamy, well-drained soil. The proper aspect in hilly country is one facing north or east. On the flat surfaces of the northern plains, and on sedimentary flats so favoured by market gardeners, aspect cannot very well be considered. In early plantations, artificial methods of preventing frost damage are necessary.

The tomato plant is a gross feeder, consequently very deep cultivation and a liberal supply of fertilizers are necessary for the plant to reach full development. The growth should be steady at all stages. Soils over-rich in nitrogen are not suitable for tomatoes. A good dressing of stable manure (well rotted) should be given; about 10 tons to the acre is usual, but on poor soils, up to 20 tons may be applied. The manure should be spread over the ground and cultivated in when the ground is being prepared for planting. Stable manure produces the highest yield from tomatoes of all known fertilizers.

In irrigation areas, after cultivating the soil as deeply as possible without bringing the clay or sub-soil to the surface, the surface should be made ready for irrigation and summer cultivation. Where summer rainfall is depended on, the surface should be planned for frequent cultivation. In such places, cultivation must be carried on as frequently as possible, and where irrigation is practicable, as many waterings should be given as the lay-out of the plantation will permit.

Manuring.

Attention has already been drawn to the value of stable manure; 10 tons will supply approximately 100 lb. of nitrogen, 56 lb. of phosphoric acid, and 100 lb. of potash. Over-supply of nitrogen usually produces a luxuriant growth of foliage and may result in a sparse setting of fruit.

For the best results, the growth of the plant should be steady and hardened at all stages. To achieve this, it is necessary to provide a food ration suitable for plant growth and fruit production. There are few, if any, exact data available concerning the quantities of plant food removed by the tomato plant from the soil. Probably a good crop will take from an acre, annually, about 80 lb. of nitrogen, 45 lb. of phosphoric acid, and 100 lb. of potash. A 10-ton dressing of stable manure would give a sufficiency of all these elements, if they were readily available. As only about 50 per cent. is set free during the season, the remainder becoming available later on, it is necessary to supplement this allowance with a readily soluble fertilizer containing a low content of nitrogen and a fairly high percentage of phosphoric acid and potash. A complete manure containing these elements could therefore be used in conjunction with stable manure. This is frequently done, and the quicker-acting fertilizers are applied just at planting time or during the season of growth of the plant. Where stable manure is not available, a dressing having the equivalent of 5 cwt. of sulphate of ammonia,

3 cwt. of superphosphate, and 2 cwt. of sulphate of potash should supply the needs of the plant.

With phosphoric acid and potash there is very little loss by leaching. With nitrogen, however, there is a fair amount, and this fact is taken into consideration in stating the quantities requisite for tomato plants on a soil that has, hitherto, not been used for purposes of crop production, requiring heavy and frequent applications of fertilizers. As fertilizers play such an important part in the growth of the plant and good crop production, the grower should try to understand the condition of the soil and its requirements, so as to secure maximum returns from his plants. For this purpose he should do all he can to make himself acquainted with, firstly, his land and its previous history, and secondly, the requirements of the tomato plant.

Pruning.

Pruning is necessary for the production of early fruits. This usually takes place when the plants are established in the field and are from 9 to 12 inches high. It consists of removing the laterals, which, if allowed to grow, cause the first flowers to drop. Sometimes the terminal bud is removed in the cold frame, about three weeks before the plants are transferred to the field, but this is done only in the case of plants that are not to be grown on the stake. Plants treated in this way develop a good root system, as well as stout stems, which provide the framework for a large bushy plant, capable of carrying heavy crops when it is growing in the field.

LUCERNE TOP-DRESSING TESTS.

IRRIGATION COMMITTEE'S INVESTIGATIONS.

During the past season extensive tests in regard to the top-dressing of lucerne have been carried out by the Irrigation Investigations Committee at Swan Hill, Tongala, and Cohuna. At Swan Hill the experiments have been in operation for five years, at Tongala for four years, and at Cohuna for three years. At each of these centres very marked and consistent results have been obtained and, taken in conjunction with the tests at Rochester and Stanhope, they show definitely that it pays to top-dress lucerne annually, that superphosphate is the most suitable fertilizer, and that liberal dressings of that fertilizer can be applied with profit.

The slow response to the insoluble manures, rock phosphate and bone fertilizer, was shown in all places, and although some slight advantage was obtained by using gypsum and lime with 2 cwt. of superphosphate, the increased yield did not warrant the expense involved, and in every case extra superphosphate had a much greater effect in improving yields.

The practice of top-dressing lucerne is now well established in all the irrigation districts where plots have been conducted, and superphosphate is generally used.

In addition to the increased yields of lucerne there are less obvious but none the less real benefits that follow on the use of superphosphate. These include prolonged life of the lucerne, extended growing period which is evident in the marked winter growth, greater palatability and improved feeding value.

The grazing of stock on superphosphate-top-dressed lucerne improves their health, and some growers maintain that this alone would justify top-dressing. If lucerne be top-dressed, the adverse effects of grazing on the stand are less marked. Some farmers in the Goulburn Valley are carrying fifteen sheep to the acre during the growing season by a system of rotation in which large flocks are put on to small paddocks of lucerne and after about six days transferred to the next paddock, coming back to the original lucerne after a period of about five weeks.

Lucerne making vigorous growth will suppress weeds, and this has been very evident in the manurial tests, where manured plots have kept down paspalum, windmill grass, white clover, &c. These weeds were not suppressed by scarifying the lucerne. In all the tests the lucerne was not cut till it had reached the early flowering stage, and it is to this fact that the successful competition with the weeds is due.

The benefits of top-dressing appear to become greater every year, and it will be noticed that even the repeated heavy dressings at Swan Hill have been consistently beneficial. These facts should dispose of the objection still made by some that superphosphate is only a stimulant.

An inspection of the plots leaves no room for doubt as to the value of top-dressing, the meagre, weedy growth on the unmanured plots providing striking contrast to the growth on the plots treated with superphosphate.

At Swan Hill the most profitable dressing has been superphosphate at the rate of 6 cwt. per acre. A dressing of 2 cwt. of superphosphate gave an increased yield of 43 cwt. per acre over the unmanured check plot. With 3 cwt. of superphosphate per annum the increased yield was 75 cwt., and with 6 cwt. the increased yield was 107 cwt. per acre. Deducting the cost of the fertilizer applied (at 6s. per cwt.) and valuing the lucerne at £2 10s. a ton, the net increased return from this application was £11 12s. per acre.

The actual yields of the plots, together with the average yields for the last 5 years, are shown below:—

Swan Hill.

Summary of Yields of Lucerne Hay per Acre.

(Hay 15 per cent. Moisture.)

Plot.	1928–29.	Average for Five Seasons.
	cwt.	cwt.
No manure	51·15	54·0
Super. 6 cwt. per acre	162·9	165·1
Super. 3 cwt. per acre	148·8	137·2
No manure	68·8	65·8
Super. 2 cwt. per acre	121·4	113·6
Super. 4 cwt. per acre (in two applications)	156·7	147·5
No manure	82·9	79·0
Super. 2 cwt., Lime 1 ton per acre	140·6	128·5
Super. 2 cwt., Gypsum 1 ton per acre	141·2	134·0
No manure	68·4	71·3
Ground rock phosphate, 2 cwt. per acre	97·4	86·2
Bone fertilizer, 2 cwt. per acre	82·4	84·6
No manure	55·6	63·3

(Lime and gypsum applied in 1924 and 1927 only).

At Tongala the most profitable dressing was one of 4 cwt. of superphosphate per acre, the increased yield being approximately 47 cwt., and the net increased return £4 14s. per acre. Details of the yields are:—

Tongala.

YIELDS OF LUCERNE HAY PER ACRE.

(Hay 15 per cent. Moisture.)

Plot.	1928–29.	Average for Four Seasons.
	cwt.	cwt.
No manure	73·36	86·35
Super. 1 cwt. per acre	89·6	91·8
Super. 2 cwt. per acre	96·9	96·5
No manure	57·2	65·7
Super. 4 cwt. per acre	115·4	109·7
Super. 4 cwt. per acre (in two applications)	108·85	105·8
No manure	48·1	55·6
Super. 2 cwt., lime 1 ton per acre	98·7	94·95
Super. 2 cwt., gypsum 1 ton per acre	94·8	91·6
No manure	54·2	59·1
Super. 2 cwt., potassium sulphate 1 cwt.	92·3	90·1
Bone fertilizer 2 cwt. per acre	68·6	68·3
No manure	40·15	49·0

(Lime and gypsum applied in 1925 only).

Superphosphate at the rate of 4 cwt. per acre again proved the most profitable dressing at Cohuna, where the increase in yield amounted to 22 cwt., and the net increased return to £1 11s. 6d. per acre. The actual yields are shown hereunder:—

Cohuna.

YIELDS OF LUCERNE HAY PER ACRE.

(Hay 15 per cent. Moisture.)

Plot.	1928–29.	Average for Three Seasons.
	cwt.	cwt.
No manure	52·6	62·3
Super. 1 cwt. per acre	60·1	68·2
Super. 2 cwt. per acre	62·5	68·3
No manure	39·1	54·8
Super. 4 cwt. per acre	72·0	79·3
Super. 4 cwt. per acre (in two applications)	73·3	76·8
No manure	45·6	57·3
Super. 2 cwt., lime 1 ton per acre	68·6	76·3
Super. 2 cwt., gypsum 1 ton per acre	71·3	86·05
No manure	55·1	76·9
Super. 2 cwt., potassium sulphate 1 cwt.	71·9	78·5
Bone fertilizer 2 cwt.	55·1	66·5
No manure	46·3	60·1

(Lime and gypsum applied in 1926 only).

STALLION REGISTER, 1929-30.

Under the Horse Breeding Acts 1919-1925.

Part 2—Registrations from 31st July to 31st August, 1929.

Cert. No	Name.	Age.	Class.	Owner.	Address
		Yrs.			
491	Acme Voyage ..	3	Light ..	Mrs. E. Gange ..	Werribee South
538	Allan Stewart ..	A	Draught ..	W. B. Tonks and Sons	Earlston
599	Angle Jack ..	A	Light ..	C. T. Hillas ..	Tallangatta
512	Ardlaw Heir ..	5	Draught ..	N. Ramsay ..	Newbridge
585	Athol Pat of Fenwick	3	Pony ..	Mrs. D. McLean	Yan Yean
581	Auchen Star ..	3	Draught ..	S. J. Lynn ..	Orbost
525	Aurelius ..	A	Light ..	N. S. Lett ..	Sale
579	Austral Pat of Fenwick	3	Pony ..	Mrs. D. McLean	Yan Yean
513	Balgrochan Warrior	4	Draught ..	N. Ramsay ..	Newbridge
524	Baritone ..	A	,, ..	G. Holloway ..	Rupanyup
584	Baron Carlyle ..	A	,, ..	E. C. Gibbs ..	Kew
499	Baron Dreadnought	A	,, ..	J. Hay ..	Numurkah
527	Baron Loch ..	4	,, ..	W. Kempton and Son	Camperdown
569	Baron Pettie ..	6	,, ..	J. Price ..	Mologa
568	Baron Watson ..	A	,, ..	J. L. McErvale ..	Brewster
586	Belmont Again ..	4	,, ..	O. Jaeschke ..	Angip
495	Belmont Ribbon ..	5	,, ..	W. Lucas ..	Goschen
502	Berkeley Bantam	A	Pony ..	R. Crozier ..	South Morang
565	Black Jack ..	5	,, ..	R. W. Jukes ..	Maryborough
549	Bobbie	A	,, ..	E. Barratt ..	Traynor's Lagoon
535	Bold Boy ..	A	Draught ..	G. Oxley ..	St. Arnaud
604	Bold Dale ..	3	,, ..	N. W. Quick ..	Mollongghip
593	Bold Douglas ..	A	,, ..	W. G. Wilkinson	Yarrawonga
541	Bold Success ..	6	,, ..	J. Rumbold ..	Laanecoorie
510	Bonnie Vale ..	5	,, ..	N. Ramsay ..	Newbridge
587	Boondilla Viceroy	4	,, ..	J. Dalrymple ..	Willenabrina
496	Bright Star ..	4	,, ..	J. Walker ..	Corio
591	Brown Alexander	3	,, ..	A. Thompson ..	Werribee
534	Bushlark ..	A	Light ..	W. H. Penaluna	Boolarra
563	Cavalier Supreme	4	Draught ..	J. C. Wallis ..	Kaniva
509	Clyde Laddie ..	A	,, ..	J. Alexander ..	Caniambo
557	Colonel Douglas ..	A	,, ..	A. C. Jorgenson ..	Katyil
574	Conqueror ..	A	,, ..	M. McKinnon ..	Berriwillock
603	Consolation ..	3	Thoro'bred	M. Lyons ..	Shepparton
597	Cooring Avon ..	3	Draught ..	R. V. Quick ..	Brim
545	Dalcrombie ..	A	,, ..	J. Rumbold ..	Laanecoorie
555	Dalradient ..	4	,, ..	J. B. Ferguson ..	Waubra
547	Dandy Duke ..	A	Pony ..	Kong Meng Bros.	Longwood
515	Domination ..	A	,, ..	C. T. Lucas ..	Pomborneit
533	Donnibristle ..	A	Draught ..	J. G. Wilson ..	Milawa
504	Dorrigal Chief ..	A	,, ..	P. R. Olson ..	Ultima
549	Eltham	A	Light ..	W. N. Greenaway	Beazley's Bridge
602	Excelsis Regulus	5	Draught ..	A. Strawhorn ..	Barfold
523	Federal Duke ..	A	,, ..	C. Thomson ..	Powlett Plains
503	Flash Voyage ..	4	Light ..	C. T. Evans ..	Rathscar

STALLION REGISTER, 1929-30—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
582	Gay Robin ..	5	Draught ..	A. Cameron ..	Orbost
505	Gay Serenader ..	A	Thoro'bred	W. Mallinson ..	Stoneyford
508	Glen Arthur ..	A	Draught ..	J. Alexander ..	Caniambo
501	Glen Isla ..	A	,, ..	F. Perry ..	Corack
536	Gold Brew ..	A	Thoro'bred	W. J. Clarke ..	Dunkeld
559	Grand Derby ..	A	Light ..	W. Balloch ..	Auburn
575	Gwalia Caesar ..	A	Pony ..	E. McKay ..	Wodonga
564	Harvest King ..	A	Thoro'bred	H. Ingram and Son	Orbost
561	Heather Douglas..	A	Draught ..	W. G. Young ..	Neerim
542	Heather Jock ..	A	,, ..	G. A. Dunnett ..	Skipton
494	Hermes of Shetland Heights	A	Pony ..	J. Laidlaw ..	Penshurst
511	Holton	3	Draught ..	Dyke Bros. ..	Gre Gre
578	Homeward Bound	A	Light ..	D. and J. McCamey	Tinamba
589	Ideal Masterpiece..	3	Draught ..	G. T. Werner ..	Jeparit
532	Jack Tar ..	A	,, ..	J. C. Dufty ..	Lorquon
488	Jimmy Lea ..	A	Light ..	W. Bradshaw, senior	Skipton
592	John Shepherd ..	A	Draught ..	A. F. Dahlenburg	Salisbury
570	Justice	A	Draught ..	A. Stanbury ..	Piangil
493	Kelly	A	Pony ..	D. Kennedy ..	Murtoa
489	Kelmscott II. ..	A	Draught ..	A. R. Yard ..	Murrayville
595	Kenlock Hero ..	3	,, ..	F. H. Baker ..	Jung
540	King Victor ..	6	,, ..	W. Clark ..	Tongala
554	Lieutenant ..	5	,, ..	McQueen Bros. ..	Waubra
506	Lochinvar ..	A	Pony ..	R. L. McRae ..	Warracknabeal
588	Lord Baron ..	3	Draught ..	C. Olson ..	Jeparit
539	Lord Huntly ..	A	,, ..	J. Orr ..	Dunnstown
546	Lord Percival ..	A	,, ..	J. Beard ..	Terang
567	Lowlands Marshall	6	,, ..	A. Kennedy ..	Arcadia
573	Major Douglas ..	A	,, ..	J. W. Scott ..	Katyil
594	March Along ..	A	,, ..	H. Carr ..	Manangatang
284	Marquis Bold ..	A	,, ..	L. Scollary ..	Logan
526	Marvette ..	3	Light ..	J. Fahey ..	Camperdown
498	Master Brook ..	6	,, ..	A. Beattie ..	Tungamah
583	McLeish ..	4	Draught ..	L. F. McLeod ..	Yarram
576	Middlerigg What's Wanted	A	,, ..	E. McKoy ..	Wodonga
519	Morocco Lad ..	A	,, ..	Mrs. E. Parish ..	Horsham
497	Nelson Chief ..	6	,, ..	L. Morrish ..	Bullarook
537	Quality ..	A	Pony ..	A. E. Callow ..	Ballarat
580	Rascel	5	Arab ..	Mrs. D. Maclean	Yan Yean
600	Real O.K. ..	5	Draught ..	J. Phillips ..	Congupna-road
516	Resolution ..	6	,, ..	Miller Bros. ..	Bacchus Marsh
556	Royal	A	,, ..	J. May ..	Joel Joel
551	Royal Hiawatha..	5	,, ..	Jolliffe Bros. ..	Newlyn
487	Royal McGregor ..	A	,, ..	Mortlock Bros. ..	Nullawil
558	Royal Shepherd ..	A	,, ..	J. Heenan ..	Miga Lake
552	Sampson ..	4	,, ..	E. R. Morton ..	Drouin
572	Seabound ..	A	Thoro'bred	G. J. McVean ..	Corryong
553	Scotland's Victor..	5	Draught ..	Clyne Bros. ..	Tinamba
521	Scottish Laird ..	A	,, ..	W. Parish ..	Horsham
550	Simon's Son ..	4	Draught ..	T. A. Nicholson..	Campbelltown
598	Sir Bute ..	A	,, ..	A. McInnes ..	Boisdale
544	Sir Everest ..	A	,, ..	A. Ralston ..	Lucknow
601	Sir William's Pride	3	,, ..	Quick Bros. ..	Mollongghip

Stallion Register, 1929-30—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
566	Sportsman's Hero	A	Draught ..	A. Kennedy ..	Arcadia
500	Stanley Cicero ..	A	,, ..	M. McNamara ..	Undera
520	Sum Time ..	A	,, ..	R. Nicholson ..	Pirlta
563	Tam O'Shanter Bill	A	Pony ..	G. Gordon ..	Ellerslie
507	Tim Anton ..	A	Thoro'bred	F. C. Coy, junior	Bookar
514	Tom Thumb II. ..	A	Pony ..	J. A. G. Rippon	Cororooke
517	Vice Regal ..	A	Draught ..	W. H. Hole, junior	Kanagulk
530	Viceroy Favourite	5	,, ..	Harris Bros. ..	Garvoc
528	Victoria Flash Brilliant	3	,, ..	Manager, Research Farm	Werribee
560	Vue Dale ..	A	,, ..	N. W. Quick ..	Mollongghip
490	Welsh Flyer ..	A	Light ..	P. J. Reid ..	Milawa
577	Widgiewa Ivo ..	A	Draught ..	E. McKoy ..	Wodonga
529	Widgiewa Norval	5	,, ..	Manager, Research Farm	Werribee
522	Winsome Chief ..	A	,, ..	C. R. Peterson ..	Kellalac
590	Wunnamurra Imprint	3	,, ..	T. Parker ..	Pepper's Plains
543	Young Comet ..	A	Pony ..	T. Adkin ..	Korumburra
531	Young Lymney Champion	A	Draught ..	W. H. Penaluna	Boolarra
191	Young Repeater ..	A	,, ..	H. L. Beck ..	Murrayville
486	Young Starling ..	A	Light ..	W. Regan ..	Moonee Ponds

VICTORIAN APPLES.

Suggestions for Packing, &c., of those intended for Export.

In a memorandum received by the Minister of Agriculture from the Victorian Trade Commissioner in London, several suggestions are made concerning the shipment of Victorian apples for the coming season.

It is pointed out that the Canadian case, wire bound, with cleats top and bottom, is best, as the contents are less liable to be bruised than are apples packed in any other. Further, the best pack can be made with the Canadian case.

When shipped, these cases are placed on their sides, and with cleats top and bottom, further ventilation is obtained. When the usual half-inch dunnage is used between every layer of cases, there is then a certain amount of air space all round the cases. It is suggested also that endeavours should be made to secure a separate chamber for the Victorian apples, so that the hold need not be opened again until the port of discharge, thereby securing their arrival in a fresh and bright condition. In years past, large quantities of our apples, when they reached London, were dull and unattractive in appearance, due to the hold in which they were carried having been opened at Fremantle, and hot fruit having been placed on top of the Melbourne consignment.

In regard to the spraying of fruit, it is pointed out that arsenic spray is still being used by some growers, and there were several complaints last season that apples showing traces of arsenic were shipped.

It is most important, if arsenic be used, that any spray marks on the fruit be removed before packing, as the Health Inspectors in London have strict orders to watch for traces of arsenic, and in the report of the Royal Commission on Arsenical Poisoning, it was recommended that penalties should be imposed where the proportion of arsenic was found to exceed 1/100ths of a grain per pound, or 1/100ths of a grain per gallon.

Growers should never ship immature apples. It is far better to wait for a few weeks than to send unripe fruit, for if buyers find any lot not to be of the best quality, they will naturally enough be hesitant about buying when a further shipment arrives.

Only firm, clean fruit should be packed for shipment, and it should be properly graded, otherwise many cases will arrive in slack condition, and be sold as "slacks."

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Cultivation.

Orchard ploughing should now be finished, and the main work for the next few months will be an endeavour to keep the soil surface loose, friable, and well opened. The consolidation of the surfaces must be avoided, as a hard, compact surface means the loss of much soil moisture, by capillary attraction. So that after rains, heavy dews, the spray pump and other traffic, it will be as well to run the harrows over the surface of the soil, so as to keep the surface well broken and to maintain a good earth mulch. If the harrows are not sufficient to break the clods, a spiked or heavy roller should be drawn over it, and then harrowed. If the weather is at all dry it is advisable to plough only as much as may be harrowed in the same day. By immediately following up the ploughing with harrowing a minimum amount of moisture is lost by capillarity.

Green manure crops should now be ploughed under, and should they be very abundant in growth, a roller should be run over them and ploughed with a coulter attached. Any of these means will serve to get the crop underground, which is a desideratum.

In addition to the retention of soil moisture, cultivation of the orchards will suppress the weeds which rob the trees of food and moisture. The suppression of weeds is an important work in the spring and summer, and they should be rigorously hoed or cultivated out.

Spraying.

Spraying for all pests and diseases is, at this time of the year, an important work in the orchard. Bordeaux or lime sulphur spraying for the black spot of apples and pears, for scab and shothole in peaches and apricots, for the leaf curl of the peach and rust of the plums and peaches, should now be completed.

Where there are indications that previous sprayings have not been thoroughly successful, a weak lime sulphur spray should be given.

Wherever they are present, nicotine sprays should be given to combat the peach aphis, and the pear and cherry slug. For the latter pest, arsenate of lead should not be used if the cherries are within a month of ripening. Arsenate of lead is so tenacious, and thus it is likely to remain on the fruit until it is ripe, when it would be dangerous to the consumer. Thus, while this property of remaining on the fruit for a considerable time is of great value in the Codling Moth spraying, it is quite of the opposite value when used for the pear and cherry slug. Either tobacco water or hellebore is useful for the eradication of this pest, as these substances do not remain long on the trees, and they are quite as effective as arsenate of lead. Even a dry dusting with lime or with ordinary soil will keep the slugs in check.

For cherry aphis, the trees should be sprayed at once with nicotine-sulphate.

Codling moth spraying, too, will be in evidence this month. It is generally assumed that the appearance of the moth is coincident with the bursting of the flowers. This is not always so—the moths frequently come slightly later than the blooming period. Owing to the rapid expansion of the fruit, it is well to follow the first calyx spraying with a second in a week's time. The use of arsenate of lead and white oil emulsion has given the best results against Codling. The proportions are 5 lb. arsenate of lead in 80 gallons; this to be used twice per calyx sprays. Then it should be followed by a 2½ per cent. spray of white oil emulsion.

Arsenate of lead may be mixed with nicotine sprays, or with Bordeaux mixture, without any detriment to either spray, if necessary.

The Vegetable Garden.

A good tilth, and a well-pulverized soil, are the main soil necessities in the vegetable garden this month. Frequent cultivations will keep in the soil moisture, and will obviate the necessity for surface waterings. At the same time, it should be remembered that the vegetable garden requires more water than the flower garden, owing to the quick growth of the plants. Quickly-grown vegetables are more tender and more luscious than slowly-grown ones: thus a good water supply will need to be maintained. Weeds are great moisture-robbers, and they should be kept out of the vegetable garden at this time of the year.

Late plantings of tomatoes may now be carried out; all early-planted plants should be fed, staked, and the laterals pinched back. A little bone-dust or superphosphate may be given, but these are not equal to animal manures, if the latter are available. Chemical manures should only be given in limited quantities, 6 or 7 cwt. per acre would be a heavy dressing, and this works out at nearly 3 ozs. per square yard. Vegetable growers may easily try this for themselves, and it will soon be seen that 3 ozs. scattered over a square yard of surface will appear to be a very light dressing.

French beans, carrot, parsnip, celery, radish, peas, and turnip seeds may now be sown. Seeds of cucumber, melon, and pumpkin family may now be sown in the open ground. All seedlings may be transplanted on favorable days, and it will be well to sprinkle the tops as well as to water the roots.

Asparagus beds may be top-dressed with manure, and kept well weeded. Such weak growths that are not gathered for eating should be cut out of the beds.

The Flower Garden.

Flower gardens are troubled with many pests at this time of the year. Rose aphis is one of the most prevalent; frequent applications of tobacco water will keep this pest in check. The hot winds should not be waited for so as to rid the garden of the pests, because a great deal of damage is done before the hot winds come. They should be sprayed in any case.

Rose mildew will also need combating. This may be done by dusting the bushes with sulphur while they are wet with the morning dew. The ground may also be sprinkled, as the fumes check the fungus.

The latest American remedy is to dust the bushes with one part of dry arsenate of lead to nine parts of sulphur. This is also a remedy for black spot of roses.

Leaf-rolling or leaf-eating insects will need to be sprayed with arsenate of lead or Paris green.

The surface should be kept well hoed so as to conserve the moisture, especially after the frequent waterings that should be given.

Chrysanthemums may be planted in soil that has been dug over two or three times, and each time digging in manure. The soil must not be too rich, but must be well drained.

Bulbs that have lost their foliage may be lifted, but do not cut the foliage, as this means loss of sap and energy.

Asters, zinnias, salvias, balsams, amaranthus, celosias, &c., lobelia, bedding begonia, iresines, alternantheras, &c., may now be planted out for summer and autumn flowers.

REMINDERS FOR NOVEMBER.

LIVE STOCK.

Horses.—Continue to feed stable horses well; add a ration of greenstuff. Rug at night. Continue hay or straw, chaffed or whole, to grass-fed horses. Feed old and badly-conditioned horses liberally. If too fat, mares due to foal should be put on poorer pasture. Turn out workers due for a spell at grass. In view of sand trouble this year horses which have been paddocked all the winter should not be put to work until properly conditioned and any sand accumulation got rid of. A course of three or four bran mashes, after a twelve hours' fast, followed by 1 to 1½ pints of linseed oil, is helpful. Repeat in two or three days, if necessary. Colts to be gelded should be operated on before hot weather sets in.

Cattle.—Crops, such as Japanese millet or Soudan grass, should now be sown (about 15 lb. to the acre) for subsequent grazing, the choice between the two being determined by the moistness or otherwise of the soil; the millet likes a fairly moist soil, whereas the Soudan grass will better withstand drier conditions. If in doubt, a mixture will do no harm. The lucky man who has a silo may now sow maize—the crop which supplies more total food nutrients to the acre (on suitable land) than any other. Maize is best sown in drills 3 feet apart, allowing 6 inches between each seed. Like all summer crops, it is entitled to well-prepared land, preferably fallow. Whenever the milk-yield is showing

signs of falling, through the spring grass becoming stalky and dry, the balance should be restored (to all cows worth it) by a little concentrate, such as bran, polly-feed, linseed meal, crushed oats, &c. (whichever is the cheapest), being careful not to waste it on animals that will not respond. If the fodder available is also deficient in quantity as well as quality, either ensilage or hay is called for in some degree, and it shows good management to have such conserved fodders available at this time, and until the millet or Soudan grass is fit to graze. The time to make silage of the oat crop is now approaching; take it when it shows the first signs of drying after blossoming. Encourage the calves to eat greenstuff wherever available, meeting any deficiency with either a little ensilage and crushed oats or with legume hay. Beware of rising weather-temperatures in treating and holding the cream. Poor-keeping quality of cream being due to three main causes, viz., contamination from inadequately-cleansed utensils, too warm a temperature, or too long holding, see that extra precautions are taken in all three directions, now that the weather is making temperature harder to control. Practise cleanly methods of milking, sterilize the utensils (including machines and separators) after every using, cool the cream and keep it cool, and despatch the cream early and there will be no trouble.

Sheep.—Prepare for dipping. Ascertain exact contents of bath before mixing.

The worried existence led by sheep which are constantly tormented by ticks and lice reacts on and seriously depreciates the quality of the wool and the condition of the sheep, and especially of lambs. If sheep are found to be ticky or lousy they should be dipped immediately, so as to relieve without delay the irritation caused by vermin. In cases where lice are very bad it will be necessary to dip young sheep twice to free them from the pest. Irritation soon causes the sheep to become restless and to scratch against posts and logs, thereby making them fail in condition and causing loss by the tearing of their fleece. Dipping, if the proper materials are used, and the work is properly carried out, is one of the most valuable investments that any owner of sheep can make. It gives returns which more than compensate for the trouble and expense incurred. When a sheep-owner becomes accustomed to using a certain dip as effectively as he should, it is then that he appreciates the results most.

Dipping does not make the wool grow where none grew before, but it keeps the skin healthy, and so enables it to grow a healthy wool. If a sheep's life be spent in feeding and sleeping, it will naturally grow a better fleece than if it has to spend time in scratching and biting, and thus losing part of the wool it has already grown. An important factor in some dipping is to keep the liquid in the dip in motion by constant stirring, as, if it is allowed to settle, the light insoluble matter floats on the top of the water, and may be the means of poisoning sheep if taken by them when passing through the dip. Valuable sheep have been poisoned in this way. Whatever brand of dip is used, the instructions accompanying it should be faithfully followed.

Lambs should not be put through the dip when thirsty, as they may drink as they swim through. For the same reason they should be kept away from any small pools in the vicinity of the exit from the draining pens. Sheep just dipped should not be put on to grass before they have dried, as the drip of the bath on the grass may cause poisoning.

Never allow the rams to join the ewes after dipping until the ewes have dried, and the same applies to the lambs and their mothers. Never hurry sheep through a dip; some cannot swim as fast as others; give them plenty of time, they can swim a fair distance in one minute, which after all is not long to wait. Their heads should be pushed under two or three times, but on no account held under. Care must be taken to see that the animal is thoroughly saturated to the very skin. Remember that the dip has to contend against the greasy nature of the fleece and skin and must be allowed time to do this. So many dipping operations fail on account of insufficient immersion, often due to the hardness of the water. Always be careful to dip every sheep, because a few undipped infested ones may reinfest the dipped sheep. It is important that sheep in the one district should be dipped about the same time, so as to avoid chances of reinfestation.

Pigs.—Supply plenty of bedding in well-ventilated styes. Keep styes clean and dry, and feeding troughs clean and wholesome. Sows may now be turned into grass run. Sows suckling young should be well fed to enable them to produce plenty of milk. Give young pigs pollard and skim milk in separate trough as soon as they will take it, and keep them fattening from the start to

get them off as early as possible. Give plenty of charcoal. Keep pigs free from vermin. The application of waste crude oil from the motor car will kill the parasite and disinfect styes. Give pigs a good supply of clean drinking water. Provide shade for the hot weather.

Poultry.—Provide plenty of green food and shade. Watch for vermin: spray crevices of perches and houses with Sheep Dip or Carbosyl. Keep water clean and cool, and out of the sun. Remove all male birds from the flock. Infertile eggs are preferable when pickling, or when placed in cool storage. Growing pullets should have free range on clean grass land.

CULTIVATION.

Farm.—Plant main crop of potatoes. Cut hay and silage. Weed early potatoes. Sow maize and millets. Weed tobacco beds, and water, if dry.

Orchard.—Ploughing, harrowing, and cultivating to be continued. Weeds to be kept down. Secure, pinch, and spray grafts with water. Spray frequently for codling moth, cherry aphis, pear and cherry slug, and peach aphis. Plant out citrus trees.

Vegetable Garden.—Hoe and mulch surface. Suppress weeds. Water where dry and hoe afterwards. Disbud and pinch back tomato plants. Sow French beans, peas, lettuce, cucumber, melon, &c., seeds.

Flower Garden.—Water and mulch. Cultivate and keep down weeds. Thin out weak wood from roses. Prune early all flowering shrubs that have finished flowering. Lift and store bulbs. Plant out chrysanthemums. Liquid-manure herbaceous perennials. Sulphur-dust for rose mildew.

BEE-KEEPING.

In most districts, October is the principal swarming month; in late localities, particularly at the higher elevations, most of the swarming takes place in November. Where a honey flow is expected from Redgum or Yellow Box during December and January, it is not wise to make a further increase in the number of colonies by allowing after-swarms to come off and hiving separately, as the parent stock would be too much depleted of bees, and there would not be sufficient time for it to recover, or for the swarms to build up, before the honey flow is on, and much of it would therefore be lost.

After-swarms can best be prevented by hiving the first or prime swarm on the old stand and moving the colony from which it came to a new stand, at the same time destroying all the queen cells in it except one—the most perfect and forward one.

If no increase at all is desired, the parent colony may be left alongside the old stand on which the swarm was hived, but with the entrance facing in a different direction. When the young queen in the swarmed stock is laying, which will be in about three weeks, the hive may be gradually turned round till it faces the same way as the swarm, and, after removing the old queen from the swarm, the two stocks may be re-united, thus making a very strong colony with a young laying queen, in the best condition for storing honey and very unlikely to swarm again the same season.

The uniting of the two stocks is best done towards evening, by first giving both a little smoke between the combs and then alternating them for the time being, so that each comb from the swarm is between two of the old combs, the object being to thoroughly mix the bees. Two or three days after, the combs can be sorted; the best should be selected for the brood chamber and the others put in the upper story. Uniting should not be attempted until the young queen has been laying for at least seven days, otherwise there will be much fighting.

In localities where the colonies have come through the Winter very strong, there is likely to be much swarming wherever Cape Weed or some other pollen-yielding plant is plentiful, the duration of blooming and of swarming depending, of course, upon the weather.

When several days of bad weather follow the hiving of swarms, it may be advisable to feed sugar syrup (one part sugar to one part water) to keep up comb-building and brood-rearing, so as to have the greatest number possible of field bees in the hive during the honey flow later on. Honey should never be used for feeding bees, unless it comes from an apiary which has been absolutely free from disease for at least two years.

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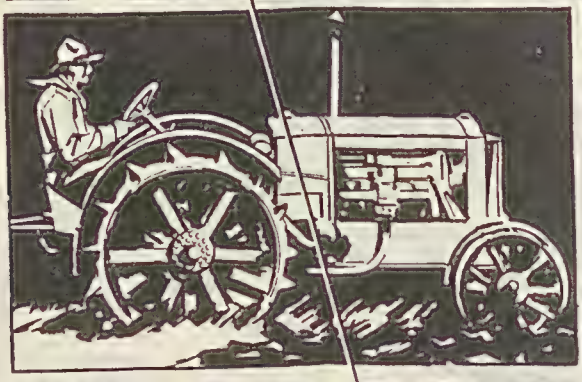

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